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Continued Betterment

An Advance of $1 a Ton in Wire

Rails, Structural Material, Tin Plates and Wire More Active—Pig Iron Weaker

The week has shown further betterment in the steel trade—largely sentimental thus far in some lines; in others, as rails, structural material, wire and tin plates, shown by an actual increase in orders. It will take a little time to find out how far this is simply the natural rebound from the very low state of the trade in December and early January and how far it represents the beginning of a genuine movement that will broaden as spring advances.

The advance of $1 a ton in wire products has done what was intended in bringing on the books a good volume of jobbers' specifications on old orders in anticipation of the spring trade. The expedient has been useful before at such a juncture. It is evident, however, that some buyers were taken unawares. Wire is now only $3 a ton above the low price reached in May, 1909, which was advanced $2 after two weeks of furious buying. Present prices are $6 a ton below the high point of 1907.

The rail order of the New York Central Lines now definitely placed, amounts to 176,750 tons, of which Steel Corporation mills will furnish 87,500 tons, the Lackawanna Steel Company 81,250 tons, and the Bethlehem Steel Company 8000 tons. These will be open hearth rails for the most part, though a considerable tonnage of ferrotitanium rails will be rolled at Buffalo. The Southern Railway has ordered 22,400 tons of rails from the Tennessee Company and 3000 tons from the Maryland Steel Company. The Western Maryland has taken 9875 tons, the Nashville, Chattanooga & St. Louis 2000 tons, and a Central Western coal road 4000 tons. The Delaware & Hudson has bought 3200 tons of light rails.

Structural orders, a good many of them long pending, are coming to the fabricating companies at a most encouraging rate. The Insurance Exchange, Chicago, 14,000 tons, was awarded to the Brown-Ketcham Iron Works. Bethlehem shapes will be used for this as well as for the McAlpin Hotel, New York, 12,000 tons, also placed last week. The Lake Superior & Ishpeming ore dock at Marquette, 5900 tons, goes to the Wisconsin Bridge Company. The American Bridge Company has the contract for the Kentucky & Indiana Railroad bridge over the Ohio at Louisville, Ky., 15,000 tons. The Chicago & Northwestern bridge order, 5000 tons, was divided. Railroads are giving out bridge work more freely, and a good tonnage is about ready for estimates, including 9000 tons for the Norfolk & Western and 3000 tons for the Burlington.

The tin plate mills are running fuller than for sev-

eral months and nearly 80 per cent. of capacity is now operating.

A more satisfactory condition is reported in sheets than for several months. The American Sheet & Tin Plate Company is operating about 56 per cent. of capacity.

At Pittsburgh good specifications are coming to the plate mills on car works contracts, the largest of these being 35,000 tons of plates and shapes for the Canadian Car & Foundry Company. Eastern plate mills are running at slightly over 50 per cent.

Pig iron inquiries have fallen off in Eastern markets, after the fairly large buying that came from those of early January. Prices have suffered in all markets. A good many foundries would buy at this level for second and third quarters, but furnaces will not make these concessions for far forward delivery. At Buffalo inquiry has been heavy and considerable business has been done at the low prices of the past two weeks.

There is accumulating evidence of lessening business and sharper competition in the foundry trade—a condition that promises no early betterment for foundry pig iron.

Inquiries for steel making pig iron include 10,000 tons of basic in eastern Pennsylvania and 5000 tons of basic at Pittsburgh for a steel foundry.

Pig tin has advanced steadily in the past week under excited and at times almost panicky buying. Transactions in New York exceeded 700 tons, the price rising to 43.25 cents. The low prices for copper have brought a number of buyers into the market, sales of the week exceeding 40,000,000 lb.

Heavy Section High Carbon Rails

Steel rail manufacturers will be interested in the radical departure some railroad engineers have made experimentally in the size of rail sections and in the results secured from these unusually heavy rails. Data were recently given in these columns of service results with 135-lb. rails on some of the curves on the Central Railroad of New Jersey. These rails were 6½ in. high and 6 in. wide on the base, and the web was ¾ in. thick. The carbon was 0.95 to 1 per cent., and in some drillings was found to be as high as 1.12 per cent. The phosphorus was less than 0.02, the open hearth process being used. The elevation of the curves is in some instances as much as 8 in. and the freight traffic is very heavy, while a good many fast trains are run. After four months it was found that the rails had satisfactorily resisted wear and there were no breakages across, though some longitudinal fractures of the rail head occurred. It is noteworthy that in every case these fractures were found where the carbon content ran above the specified maximum. It was noticed also that all these fractures were on the outside of the inner rail of the curve and were due, the engineers of the road concluded, to the excessive pressure on that side of the head underneath the false flange of worn locomotive tires. The shoulder in the false flange cut a slight groove in the top of the rail and the fracture started in the groove.

In these tests, involving 1000 tons of rails, the high curve elevation has had much to do with the results. The significant fact in the experiments is that with such high carbon steel there have been no cross breaks under the severe service imposed on the rails. The resistance to wear, moreover, is much greater than has been found with average open hearth rails.

We may expect to hear more of heavier section rails of high carbon and low phosphorus steel. The enormous increases in train loads and the commonness of high train speeds will compel abandonment of some of the comparatively slender sections from which railroads are now exacting so much on tangents as well as on curves. The rail mills are asked each year to produce better rails, but 70 and 75-lb. sections are required to stand a service for which they were never designed. High carbon requirements must be accompanied by much heavier sections, and it will not be many years before 125-lb. rails will be as common as 100-lb. rails are to-day. The rail mills must be prepared to take larger ingots and that will mean that early passes will be in heavier blooming mills, standing behind the present-day blooming mills—a procedure already anticipated at the Gary mill.

It is easily conceivable that heavier section rails will figure largely in the maintenance demands of the next decade. The rail mills will not lack for tonnage, whatever comes of the predictions that new track building is to be a diminishing or at best a stationary factor.

A Noteworthy Anti-Boycott Decision

An important addition has been made to the judicial decisions affecting the labor laws of the State of New York by Judge Blackmar of the New York Supreme Court, in the case of the Albro J. Newton Company against the Carpenters' and Joiners' Union. The company operates an open shop in the manufacture of woodwork for buildings. The union has for a long time attempted to prevent the use of woodwork made in open shop factories by calling strikes on buildings in which it is installed. It is stated that it has hounded the open shop, in some cases, to literal extermination. When an attack was started on the Albro J. Newton Company a stubborn fight was made in which that company applied for an injunction to restrain the union from its action and in its fight had the support of the American Anti-Boycott Association and of other manufacturers of woodwork. The injunction was issued after a careful hearing before Judge Blackmar, who handed down a clear and forcible decision, from which the following extracts are taken:

The plaintiff has a right to carry on business as absolute as the right of workmen to control their own time and labor. This right is a property right. The relations of a dealer to his customers and to the trade generally is called good-will and is property which the law is bound to protect. There is no branch of the law better settled than the jurisdiction of equity to protect the good-will of a business against trespass and invasion by its writ of injunction. This property is of a peculiar intangible nature; but it is the subject of bargain and sale; it may be capitalized as the basis of a corporate stock issue; and it is often the most important asset possessed by a manufacturer or merchant. To bring an "obstinate" manufacturer to terms, an attack on his good-will would be fully as effective as to tear down his factory or to smash his machinery.

Certain methods and weapons the law permits. Others it prohibits. It permits the strike on the one side and the lockout on the other. But each combatant must respect the rights of the other guaranteed by our constitution. Among these are life, liberty and property. Violence against persons and tangible property will not be permitted. Neither will attacks on intangible property rights, like business, good-will or trade, be permitted. One cardinal principle must be borne in mind, that any element of illegality essential to a scheme or combination makes the whole illegal. This principle the defendants have overlooked. They have found a lawful means, viz., strikes, and an ultimate lawful end, viz., the improvement of labor; but they have forgotten that

the very turning point in their scheme, and which alone makes it effective, is the coercion of plaintiff by injuring property rights. This is exactly what the defendants intended, it is what they have done, and it is unlawful.

The exposition of individual and property rights here made is clearly applicable to conditions throughout the country. It is an encouragement to all employers and manufacturers whose interests are attacked in this vicious manner. The boycott is a method of enforcing the exactions of unions which should be strenuously resisted wherever attempted. It is highly creditable to our courts that when the question has been brought before them for adjudication their decisions have been so strongly against the practice.

Increasing Machinery Exports

The growing exports of American metal working machinery, especially machine tools, can be attributed in a large measure to the increasing care taken by machinery manufacturers to meet the requirements of foreign buyers. The familiar complaint of American consular representatives that American manufacturers do not pack their export shipments properly, and other superficial criticisms, ceased to satisfy machinery makers long since as a reason for their small share of export trade, and a large number of them have gone deeper into the export problem by personal investigation with excellent results. Many of them found that a very important reason was that their goods were not properly represented, or rather, through the ignorance of their foreign selling agents, were entirely misrepresented. Machine tool manufacturers ascertained that their products were being handled in many foreign countries by people who could hardly distinguish a milling machine from a textile loom. They discovered that literature published by their foreign representatives, and often paid for by the manufacturer, entirely misrepresented the equipment advertised and described the working parts in a manner that aroused the mirth of mechanical engineers understanding the language in which it was printed. Frequently, it was learned, sales of a machine had been made at exorbitant prices and with undue profit to the selling agent. These abuses were the direct result of granting agencies to men whose credit was found to be fairly good, without investigation into their knowledge of mechanics or their ability to sell machinery.

Of late many machine tool builders have been paying more attention to their foreign trade literature. They have increased their sales abroad by publishing carefully prepared catalogues in other languages than English, principally in Spanish, French and German. The export department of the National Association of Manufacturers has been used by many of them in their translation work, and its assistance has been utilized in establishing foreign connections to such an extent that the work of the department has grown wonderfully. Many machine tool men have investigated the foreign field by personal visits and have installed agencies in charge of competent engineers. Others are following their example after learning of the successful results obtained. It is because of these things that the exports of metal working machinery have recently grown. It will be well when all manufacturers, in this line at least, cease to depend for their foreign trade information on agents—consular and otherwise—who know nothing of the mechanical requirements of the countries upon which they make reports.

The Steel Corporation's Exports in 1910

The United States Steel Corporation's exports of the products of its subsidiary companies last year reached the record total of 1,489,819 tons, or nearly 40 per cent. in excess of the largest previous year's total, which was 1,079,319 tons in 1906. Attention has been called from time to time to the strong reinforcement the Steel Corporation's diminishing business at home has had in the past year from markets abroad. Rails have been a large item in this increase, about 50,000 tons more having been exported last year than the 299,000 tons of 1909. Sheets and plates show an increase of more than 100,000 tons and structural steel of about 50,000 tons.

Production and Exports of Finished Products by the United States Steel Corporation.—Net Tons.

	Exports.	Production shipped.	Per cent. exported.
1905	953,858	9,226,386	10.3
1906	1,079,319	10,578,433	10.2
1907	1,014,082	10,376,742	9.8
1908	799,406	6,206,932	12.9
1909	1,009,746	9,859,660	10.2
1910	1,489,819	.....	...

The statement has been made, though not confirmed as yet by the publication of the official figures, that the exports of the Steel Corporation in 1910 were 13.5 per cent. of its entire shipments. This would indicate total shipments somewhat in excess of 11,000,000 tons, or 450,000 tons more than the previous high record, made in 1906.

The Bureau of Statistics estimates that the total value of iron and steel exports from the United States last year was above $200,000,000, as against $157,674,394 in 1909, $151,113,114 in 1908 and $197,066,781, the high record, in 1907. The exports of such iron and steel products as are reported in tons were probably about 1,540,000 gross tons last year, against 1,302,000 tons in 1907, indicating that prices last year were below those of 1907. It should be noted that the Steel Corporation's exports as tabulated above are in net tons. Those for 1910 are equivalent to 1,330,000 gross tons, which is about 86 per cent. of the total exports of the rolled and other products which are reported by weight.

Private Industrial Museums

Each year valuable knowledge of the manufacturing arts is destroyed as machinery and processes and products are replaced or improved. If preserved in some form, by sample or photographs or models, or by the machinery or apparatus itself, important records are established. Inventors know the value of being able to look over what has been done by others along the lines upon which they are working. Consequently the industrial museum is coming to be recognized as having educational value of no insignificant degree. In various manufacturing centers the effort is being made to create a territorial institution which would preserve the products of local works and the methods of their manufacture, going back as far as possible and maintaining the succeeding steps of future development without a break in chronological sequence for the benefit of those who will come after in the various fields. In a few cases individual enterprises have taken up this work in a systematic manner and their collections are of great interest. Many inventors have come to grief because they have unknowingly repeated the errors in elements of design of their predecessors, constituting failures which would have been avoided

easily had there been a collection from which to make preliminary studies. At the same time the museum may furnish useful suggestions to the designer.

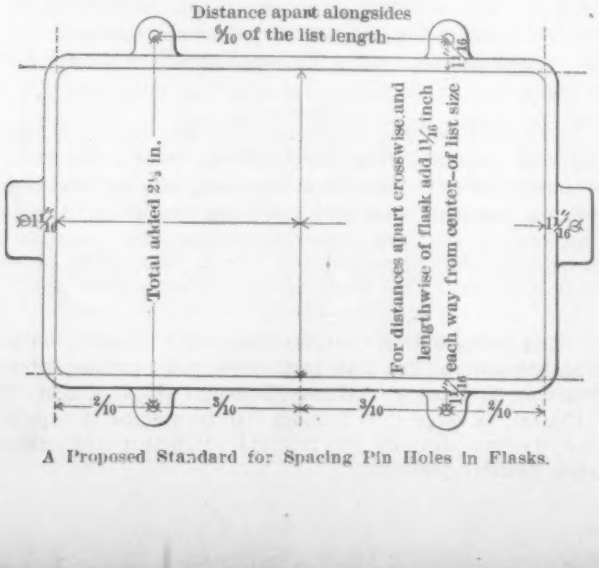
Official Lists of Machine Tool Builders

The National Machine Tool Builders' Association is compiling important lists of its trade which will be circulated in pamphlet form. The purpose is to have a complete directory of the manufacturing branch of the industry. With this end in view, Secretary Charles E. Hildreth, Worcester, Mass., solicits the co-operation of all machine tool builders, whether or not they are affiliated with the association. Originally the pamphlet will consist of either three or four lists. The first will contain the names of the members in alphabetical order, great care being taken to secure the exact firm or corporation title. A second list has the names of the commercial and mechanical heads of the various establishments, and will constitute an exceedingly valuable directory. Some private houses have lists of this nature, in certain cases covering the field of customers very completely, as the result of years of systematic collecting of the information. In correspondence, in calling at works and in the sending out of literature, it is of much advantage to know the individual who would be most interested and with whom the most direct results are to be obtained. A complete list of this character, covering the American machine tool industry, should be sought in a large way. A third list will be of members, by headings, according to the classes of machinery manufactured. Subdivisions of the various general types of tools will reveal much detailed information. The fourth list will consist of machine tool builders who are not members and may not be included in the original pamphlet. This list should reduce in length rapidly, in ratio to the growth of the association.

Correspondence

Standardizing Flask Pin Holes

To the Editor: Manufacturers of different kinds of metal goods, especially those who do not have sufficient business of that kind to keep a foundry of their own in continuous operation, are considerably handicapped, and unable to compete with importers or large concerns making similar goods because their patterns mounted on match plates that turn out better and cheaper castings cannot be used at such foundries as they would like, since the pin holes of the flasks in no two foundries are located the same on any one size. The system here proposed makes the whole problem as simple as A.B.C., and is so easily understood that any boy could make flasks on which any match-plate constructed on the same principle would be sure to fit. It is up to the metal finishers to insist on foundries keeping standard flasks, that any one can make, as there is not and cannot be any patent on them, and to place their orders for castings only with such foundries as have standard flasks.


Distance apart alongsides
⅒ of the list length
Total added 2½ in.
For distances apart crosswise and lengthwise of flask add 1 1/16 inch each way from center of list size
1 1/16
⅒
⅒
⅒
⅒

A Proposed Standard for Spacing Pin Holes in Flasks.

It will be noticed from the engraving that the spacing of the pin holes along the sides is applicable to any and all sizes of flasks, and that their location is 1 1-16 in. outside the boundaries of the match-plate. That dimension was chosen as it registers with 27 mm., so that no change will be required to conform to the metric system should that be adopted later.

The diameter of the pins and pin holes should be ½ in. for all flasks having less than 500 sq. in. of surface at the parting line and ⅝ in. for all between 500 and 1000 sq. in., and ¾ in. for all over 1000 sq. in.

H. I. Wood.

New York City, January 10, 1911.

British Interests Acquire Brazilian Iron Mines

An English company has secured control of what are spoken of as important iron ore properties in Brazil. They are the deposits of Itabira do Matto Dentro in the State of Minas Geraes. The nearest coast town is Port Victoria, which is north of Rio Janeiro. The London *Iron and Coal Trades Review* says that the mines certainly contain 60,000,000 to 70,000,000 tons of ore, and in the opinion of experts will be found eventually to have several times this quantity. Much of the ore is said to run from 69.3 to 69.8 per cent. metallic iron, 0.10 per cent. silica, 0.004 to 0.01 per cent. phosphorus, and 0.016 per cent. sulphur, with almost no moisture. A railroad extension to the mines, a distance of 60 miles, is arranged for, and the electrification and equipping of the road to carry 2,000,000 tons of ore a year to the coast are in the hands of the British firm of Dick, Kerr & Co., Ltd. The ore has very little overburden, and it is estimated that the cost of putting it on cars will be between 25 and 40 cents. The interesting statement is made that the contract conveying the property to British owners was signed but a few hours in advance of the arrival of a mining engineer from the United States prepared to negotiate on behalf of American interests.

The House Naval Affairs Committee at Washington, January 20, authorized an increase in the navy to cost $36,000,000, the programme taking in two new dreadnoughts of not less than 27,000 tons, two colliers, eight torpedo boat destroyers and four submarines. The two new battleships are to be equipped with 12 14-in. guns each, and may reach 28,000 tons displacement, making them the most formidable vessels ever authorized in this country. The committee also recommends that Congress give Secretary Meyer authority to build the battleship New York, authorized at its last session, at a private yard, as the Secretary has shown that it will cost the Government at least $1,700,000 more, on account of the eight-hour law, to construct the New York at Brooklyn.

R. S. Wile, general manager of the American Detinning Company, Connellsville, Pa., states that the plant is completed, and will commence to operate about February 1. The main building is 50 x 60 ft., two stories, with several smaller buildings for storage use. The plant has connections with the Baltimore & Ohio Railroad through a siding. It will be devoted to detinning bright tin plate scrap. All machinery except a hydraulic press for compressing the scrap into marketable shape has been purchased.

The annual meeting of the directors of Joseph T. Ryerson & Son, Chicago, was held January 23. Clyde M. Carr was elected president of the company, succeeding Edward L. Ryerson, who becomes chairman of the Board of Directors. Joseph T. Ryerson was elected vice-president and treasurer, and Gilbert H. Pearsall secretary.

New Publications

Outlines of Iron and Steel Metallurgy (Grundzüge des Eisenhüttenwesens). By Dr. T. Geilenkirchen. Pages, 249; illustrations, 66; plates, 5. Price, cloth bound, 8 marks. Published by Julius Springer, Berlin, Germany.

This first volume of three is divided into three parts which are, respectively, "Iron and Its Properties," "The Occurrence of Iron in Nature and the Methods of Its Production from the Ore," and "Heat and Its Production in the Iron Industry." The first part covers 55 pages and deals in a very brief way with a large number of subjects, such as the uses of steel and iron, properties of pure iron, iron and carbon system of alloys, classification, the influence of the various elements on iron, heat treatment and the various methods of testing iron and steel. Under microstructure a curious mistake is noticed on Plate 1. The second photograph on this plate is a beautiful one of gray iron, showing very plainly the plates of graphite and the phosphide eutectic. It is, however, referred to as if it were white iron, both underneath the photograph and on page 14. The feeling one has after reading this first part is that it is altogether too concise. The second part gives the properties and analyses of the various ores used in Germany, and by means of a map the distribution of the ores and the location of the blast furnaces are clearly shown. Then comes a short discussion of oxidation and reduction and of the various slags of the iron and steel producing processes. The third part takes up the remainder of the book from page 91. It deals in considerable detail with fuels and refractory materials. There is an excellent section of 30 pages on "Coke and Its Production," taking up, with diagrams, the typical German coke ovens. This is followed by another good section on "Gaseous Fuel," in which the various gas producers are considered. There is also a discussion of the various furnaces in which the fuel is burnt. Finally after two short sections on minor methods of heat production there comes a discussion of refractory materials.

The book gives promise of being of great assistance to students and beginners in iron and steel metallurgy. It is to be followed quickly by Volumes 2 and 3, which will deal with the metallurgy and mechanical treatment of iron and steel. G. B. W.

The Analysis of Paints and Painting Materials.—By Henry A. Gardner and John A. Schaeffer. Size, 6 x 9 in.; pages, 100. Bound in cloth. Price, $1.50 net. Published by the McGraw-Hill Book Company, 239 West Thirty-ninth street, New York City.

A series of selected methods for the analysis of materials used in paint manufacture are presented by the authors in this book. These methods include new ones worked out by the authors as well as some of the older standard ones. No attempt has been made to give any detailed explanation of the operations used in ordinary quantitative chemical analysis, as the authors assume that the readers are fairly well versed therein.

The book is logically divided into three chapters and two appendices. The first of these is devoted to the analysis of dry pigments, and contains methods for analyzing lead and zinc followed by those for the various other colored pigments. The analysis of mixed pigments and paints occupies the second chapter and general methods for the analysis of a mixed white paint are given. No special method is given for analyzing mixed colored paints as the composition of the color present can be determined by a qualitative examination and the constituents of the particular coloring matter determined according to the methods outlined in Chapter I. The final chapter is given over to an analysis of paint vehicles and varnishes and the methods for determining the amounts of water, linseed oil and turpentine, as well as the constituents of varnish and japan and shellac. On account of the increasing use of paint containing bituminous matter, methods for the analysis of paints of this character are given in appendix A. The portions of the paint specification of the Army and Navy departments referring to the chemical requirements are given in appendix B, so that a chemist engaged in the examination of such materials may become better acquainted with the requirements.

A Pocketbook of Mechanical Engineering.—By Charles M. Sames. Fourth edition. Bound in flexible leather. Size, 4 x 6⅝ in.; pages, 220; 42 illustrations. Price, $2. Published by the author, 542 Bramhall avenue, Jersey City, N. J.

This book contains a collection of tables, data, formulas and examples, comprising the greater part of the reference information usually required by mechanical engineers and students, condensed into a volume, the dimensions of which are small enough to be conveniently carried in the pocket. In preparing this last edition, new matter has been incorporated to bring the work thoroughly up to date. Among these added subjects are new alloys and alloy steels, critical speed of shafts, new steam tables, formulas dealing with saturated and superheated steam, steam turbines, electric drive and the power required for machine tools and cooling towers. Besides these subjects new data have been added at a number of points in the text.

The Scientific American Cyclopedia of Formulas.—Edited by Albert A. Hopkins. Bound in cloth. Size, 6½ x 8¾ in.; pages, 1077; 200 illustrations. Price, $5 net. Published by Munn & Co., Inc., 361 Broadway, New York City.

This is practically a new book and contains over 15,000 of the most useful formulas and processes which represent almost every branch of the useful arts. The formulas are classified and arranged in 27 chapters, and an appendix of three parts, each of which contains related subjects, while a complete index makes it easy to find any desired formula. A chapter on chemical, pharmaceutical and technical manipulation which is an entirely new departure in a book of this character, has been prepared by the aid of well-known chemists and contains a considerable amount of practical information. A price-list of odd technical products and many useful tables are also included.

Practically all ordinary subjects upon which information might be desired are covered in the book. There are chapters on accidents and energencies, alloys and amalgams, adhesives of all kinds, the coloring of metals, electrometallurgy, the heat treatment of metals, lubricants, paints, photography, waterproofing and fireproofing. The appendix is divided into three parts, the first of which deals with miscellaneous formulas which do not lend themselves to classification in the main chapters readily, the chapter on chemical manipulation which has been previously referred to and a table of the principal weights and measures.

A new publication called *Data* has been recently started by the Technical Data & Appliance Company, 92 La Salle street, Chicago, Ill. This magazine, which is published monthly, is devoted exclusively to engineering data and is intended to supplement the regular engineers' pocketbook by providing information on various subjects which can be readily filed either in a card index file or a small loose leaf pocket note book. With this object in view, the engineering data presented is in tabloid form, being printed on leaves measuring 3 x 5 in., which can be readily detached from the binder for filing.

The William Tod Company, Youngstown, Ohio, has received a contract from the American Sheet & Tin Plate Company, covering runout tables, complete, for the new jobbing and plate mills now under erection by the American Sheet & Tin Plate Company, at Gary, Ind. This contract is in addition to the order for the jobbing and plate mills awarded to the same company some months ago.

The Buckeye Steel Castings Company, Columbus, Ohio, and Pittsburgh, Pa., has just closed the purchase of a tract of 85 acres at Indiana Harbor, Ind., at a cost of $150,000. A large steel foundry will be erected to supply the Western demand for railroad equipment and other steel foundry products.

The Iron and Metal Markets

A Comparison of Prices

Advances Over the Previous Week in Heavy Type, Declines in Italics.

At date, one week, one month and one year previous.

	Jan.25, 1911.	Jan.18, 1911.	Dec.28, 1910.	Jan.26, 1910.
PIG IRON, Per Gross ton:				
Foundry No. 2, standard, Philadelphia	$15.50	$15.50	$15.50	$19.00
Foundry No. 2, Southern, Cincinnati	14.25	14.25	14.25	17.25
Foundry No 2, Birmingham, Ala.	11.00	11.00	11.00	14.00
Foundry No. 2, local, Chicago	15.50	15.50	16.00	19.00
Basic, delivered, eastern Pa.	14.25	14.25	14.75	18.75
Basic, Valley furnace	13.25	13.25	13.25	16.50
Bessemer, Pittsburgh	15.90	15.90	15.90	19.90
Gray forge, Pittsburgh	14.15	14.15	13.90	17.40
Lake Superior charcoal, Chicago	*17.50*	18.00	18.00	19.50
BILLETS, &c., Per Gross Ton:				
Bessemer billets, Pittsburgh	23.00	23.00	23.00	27.50
Forging billets, Pittsburgh	28.00	28.00	28.00	31.00
Open hearth billets, Philadelphia	25.40	25.40	25.40	30.60
Wire rods, Pittsburgh	28.00	28.00	28.00	33.00
OLD MATERIAL, Per Gross Ton:				
Iron rails, Chicago	14.50	14.50	15.50	20.00
Iron rails, Philadelphia	17.00	17.00	17.00	20.50
Car wheels, Chicago	13.00	13.00	13.50	18.00
Car wheels, Philadelphia	13.00	13.00	13.00	17.50
Heavy steel scrap, Pittsburgh	13.50	13.50	13.50	17.50
Heavy steel scrap, Chicago	11.50	11.50	12.00	16.00
Heavy steel scrap, Philadelphia	12.50	12.50	12.50	17.00
FINISHED IRON AND STEEL, Per Pound:	Cents.	Cents.	Cents.	Cents.
Bessemer steel rails, heavy, at mill	1.25	1.25	1.25	1.25
Refined iron bars, Philadelphia	1.32½	1.32½	1.32½	1.60
Common iron bars, Chicago	1.30	1.30	1.35	1.60
Common iron bars, Pittsburgh	1.35	1.35	1.35	1.70
Steel bars, tidewater, New York	1.56	1.56	1.56	1.66
Steel bars, Pittsburgh	1.40	1.40	1.40	1.50
Tank plates, tidewater, New York	1.56	1.56	1.56	1.71
Tank plates, Pittsburgh	1.40	1.40	1.40	1.55
Beams, tidewater, New York	1.56	1.56	1.56	1.71
Beams, Pittsburgh	1.40	1.40	1.40	1.55
Angles, tidewater, New York	1.56	1.56	1.56	1.71
Angles, Pittsburgh	1.40	1.40	1.40	1.55
Skelp, grooved steel, Pittsburgh	1.25	1.25	1.25	1.50
Skelp, sheared steel, Pittsburgh	1.30	1.30	1.30	1.60
SHEETS, NAILS AND WIRE, Per Pound:	Cents.	Cents.	Cents.	Cents.
Sheets, black, No. 28, Pittsburgh	2.20	2.20	2.20	2.40
Wire nails, Pittsburgh*	**1.75**	1.70	1.70	1.85
Cut nails, Pittsburgh	1.60	1.60	1.60	1.85
Barb wire, galv., Pittsburgh*	**2.05**	2.00	2.00	2.15
METALS, Per Pound:	Cents.	Cents.	Cents.	Cents.
Lake copper, New York	12.75	12.75	13.00	13.87½
Electrolytic copper, New York	*12.37½*	12.50	12.75	13.62½
Spelter, New York	5.55	5.55	5.60	6.25
Spelter, St. Louis	5.40	5.40	5.50	6.00
Lead, New York	4.50	4.50	4.50	4.70
Lead, St. Louis	4.35	4.35	4.35	4.60
Tin, New York	**43.25**	41.75	38.45	32.45
Antimony, Hallett, New York	7.25	7.87½	7.75	8.25
Tin plate, 100-lb. box, New York	$3.84	$3.84	$3.84	$3.84

* These prices are for largest lots to jobbers.

Prices of Finished Iron and Steel f.o.b. Pittsburgh

Freight rates from Pittsburgh in carloads, per 100 lb.: New York, 16c.; Philadelphia, 15c.; Boston, 18c.; Buffalo, 11c.; Cleveland, 10c.; Cincinnati, 15c.; Indianapolis, 17c.; Chicago, 18c.; St. Paul, 32c.; St. Louis, 22½c.; New Orleans, 30c.; Birmingham, Ala., 45c. Rates to the Pacific Coast are 80c. on plates, structural shapes and sheets, No. 11 and heavier; 85c. on sheets, Nos. 12 to 16; 95c. on sheets, No. 16 and lighter; 65c. on wrought boiler tubes.

Structural Material.—I-beams and channels, 3 to 15 in., inclusive, 1.40c. to 1.45c., net; I-beams over 15 in., 1.50c. to 1.55c., net; H-beams over 8 in., 1.55c. to 1.60c.; angles, 3 to 6 in., inclusive, ¼ in. and up, 1.40c. to 1.45c., net; angles over 6 in., 1.50c. to 1.55c., net.; angles, 3 in., on one or both legs, less than ¼ in. thick, 1.45c., plus full extras as per steel bar card, effective September 1, 1909; tees, 3 in. and up, 1.45c., net; zees, 3 in. and up, 1.40c. to 1.45c., net; angles, channels and tees, under 3 in., 1.45c., base, plus full extras as per steel bar card of September 1, 1909; deck beams and bulb angles, 1.70c. to 1.75c., net; hand rail tees, 2.50c.; checkered and corrugated plates, 2.50c., net.

Plates.—Tank plates, ¼ in. thick, 6¼ in. up to 100 in. wide, 1.40c. to 1.45c., base. Following are stipulations prescribed by manufacturers, with extras to be added to base price (per pound) of plates:

Rectangular plates, tank steel or conforming to manufacturers' standard specifications for structural steel dated February 6, 1903, or equivalent, ¼-in. thick and over on thinnest edge, 100 in. wide and under, down to but not including 6 in. wide, are base.

Plates up to 72 in. wide, inclusive, ordered 10.2 lb. per square foot are considered ¼-in. plates. Plates over 72 in. wide must be ordered ¼ in. thick on edge, or not less than 11 lb. per square foot, to take base price. Plates over 72 in. wide ordered less than 11 lb. per square foot down to the weight of 3-16-in. take the price of 3-16-in.

Allowable overweight, whether plates are ordered to gauge or weight, to be governed by the standard specifications of the Association of American Steel Manufacturers.

Gauges under ¼-in. to and including 3-16-in. on thinnest edge	$0.10
Gauges under 3-16-in. to and including No. 8	.15
Gauges under No. 8 to and including No. 9	.25
Gauges under No. 9 to and including No. 10	.30
Gauges under No. 10 to and including No. 12	.40
Sketches (including all straight taper plates), 3 ft. and over in length	.10
Complete circles, 3 ft. in diameter and over	.20
Boiler and flange steel	.10
"A. B. M. A." and ordinary firebox steel	.20
Still bottom steel	.30
Marine steel	.40
Locomotive firebox steel	.50
Widths over 100 in. up to 110 in., inclusive	.05
Widths over 110 in. up to 115 in., inclusive	.10
Widths over 115 in. up to 120 in., inclusive	.15
Widths over 120 in. up to 125 in., inclusive	.25
Widths over 125 in. up to 130 in., inclusive	.50
Widths over 130 in	1.00
Cutting to lengths or diameters under 3 ft. to 2 ft., inclusive	.25
Cutting to lengths or diameters under 2 ft. to 1 ft., inclusive	.50
Cutting to lengths or diameters under 1 ft.	1.55

No charge for cutting rectangular plates to lengths 3 ft. and over.

TERMS.—Net cash 30 days.

Sheets.—Makers' prices for mill shipments on sheets in carload and larger lots, on which jobbers charge the usual discounts for small lots from store, are as follows: Blue annealed sheets, Nos. 3 to 8, U. S. standard gauge, 1.55c.; Nos. 9 and 10, 1.65c.; Nos. 11 and 12, 1.70c.; Nos. 13 and 14, 1.75c.; Nos. 15 and 16, 1.85c. One pass, cold rolled, box annealed sheets, Nos. 10 to 12, 1.85c.; Nos. 13 and 14, 1.90c.; Nos. 15 and 16, 1.95c.; Nos. 17 to 21, 2c.; Nos. 22, 23 and 24, 2.05c.; Nos. 25 and 26, 2.10c.; No. 27, 2.15c.; No. 28, 2.20c.; No. 29, 2.25c.; No. 30, 2.35c. Three pass cold rolled sheets, box annealed, are as follows: Nos. 15 and 16, 2.05c.; Nos. 17 to 21, 2.10c.; Nos. 22 to 24, 2.15c.; Nos. 25 and 26, 2.20c.; No. 27, 2.25c.; No. 28, 2.30c.; No. 29, 2.35c.; No. 30, 2.45c. Galvanized sheets, Nos. 10 and 11, black sheet gauge, 2.20c.; Nos. 12, 13 and 14, 2.30c.; Nos. 15, 16 and 17, 2.45c.; Nos. 18 to 22, 2.60c.; Nos. 23 and 24, 2.70c.; Nos. 25 and 26, 2.90c.; No. 27, 3.05c.; No. 28, 3.20c.; No. 29, 3.30c.; No. 30, 3.50c. Painted roofing sheets, No. 28, $1.55 per square. Galvanized sheets, No. 28, $2.75 per square for 2½-in. corrugations. All above prices are f.o.b. Pittsburgh, terms 30 days net, or 2 per cent. cash discount 10 days from date of invoice.

Wrought Pipe.—The following are the jobbers' carload discounts on the Pittsburgh basing card on wrought pipe, in effect from October 1:

	Steel. Black.	Steel. Galv.	Iron. Black.	Iron. Galv.
Butt Weld.				
⅛, ¼, ⅜ in.	72	58	68	54
½ in.	75	63	71	59
¾ to 1½ in.	79	69	75	65
2 to 3 in.	80	70	76	66
Lap Weld.				
2 in.	76	66	72	62
2½ to 4 in.	78	68	74	64
4½ to 6 in.	77	67	73	63
7 to 12 in.	75	59	71	55
13 to 15 in.	51½	..	..	..
Butt Weld, extra strong, plain ends, card weights.				
⅛, ¼, ⅜ in.	69	59	65	55
½ in.	74	68	70	64
¾ to 1¼ in.	78	72	74	68
2 to 3 in.	79	73	75	69
Lap Weld, extra strong, plain ends, card weight.				
2 in.	75	69	71	65
2½ to 4 in.	77	71	73	67
4½ to 6 in.	76	70	72	66
7 to 8 in.	69	59	65	55
9 to 12 in.	64	54	60	50
Butt Weld, double extra strong, plain ends, card weight.				
½ in.	64	58	60	54
¾ to 1¼ in.	67	61	63	57
2 to 3 in.	69	63	65	59
Lap Weld, double extra strong, plain ends, card weight.				
2 in.	65	59	61	55
2½ to 4 in.	67	61	63	57
4½ to 6 in.	66	60	62	56
7 to 8 in.	59	49	55	45

THE IRON AND METAL MARKETS

Plugged and Reamed.

1 to 1½, 2 to 3 in.	Butt Weld	Will be sold at two (2) points lower basing (higher price) than merchant or card weight pipe, Butt or Lap Weld as specified.
2, 2½ to 4 in	Lap Weld	

The above discounts are for "card weight," subject to the usual variation of 5 per cent. Prices for less than carloads are three (3) points lower basing (higher price) than the above discounts.

Boiler Tubes.—Discounts on lap welded steel and charcoal iron boiler tubes to jobbers in carloads are as follows:

	Steel.	Iron.
1 to 1¼ in	49	43
1¾ to 2¼ in	61	43
2½ in	63	48
2¾ to 5 in	69	55

2½ in. and smaller, over 18 ft., 10 per cent. net extra.
2¾ in. and larger, over 22 ft., 10 per cent. net extra.

Less than carloads to destinations east of the Mississippi River will be sold at delivered discounts for carloads lowered by two points, for lengths 22 ft. and under; longer lengths, f.o.b. Pittsburgh.

Wire Rods.—Bessemer rods, $28; open hearth and chain rods, $28.

Steel Rivets.—Structural rivets, ¾ in. and larger, 1.90c., base; cone head boiler rivets, ¾ in. and larger, 2c., base; ⅝ in. and 11-16 in. take an advance of 15c., and ½ in. and 9-16 in. take an advance of 50c.; in lengths shorter than 1 in. also take an advance of 50c. Terms are 30 days, net cash, f.o.b. mill.

Pittsburgh

PARK BUILDING, January 25, 1911.—(*By Telegraph.*)

Pig Iron.—Sentiment in the pig iron trade has slightly improved, and several furnaces that make foundry iron are asking higher prices. As yet the Standard Sanitary Mfg. Company has not closed for the 6000 to 8000 tons of Northern and Southern foundry for which it has been negotiating for over a week. The American Steel Foundries is reported in the market for 5000 tons of basic for its works at Alliance, Ohio. There is very little demand for Bessemer iron, for which furnaces are still quoting $15, but several lots of Bessemer are being offered by dealers as low as $14.50 and $14.75, Valley furnace. A sale is reported of about 2000 tons of gray forge for delivery February to June at about $13.25, Valley furnace. We quote Bessemer iron nominally at $15; basic, $13.25 to $13.50; No. 2 foundry, $13.75, and gray forge, $13.25, all at Valley furnace, the freight rate to the Pittsburgh district being 90c. a ton.

Steel.—Several steel makers report that specifications against contracts for billets and sheet and tin bars are heavier than for some time. Shipments to the sheet and tin plate mills are showing a decided increase. The new demand for billets and bars is not heavy, being mostly for small lots. We quote Bessemer and open hearth billets, 4 x 4 in. and up to, but not including, 10 x 10 in., at $23, base, and sheet and tin bars in 30-ft. lengths, $24, f.o.b. Pittsburgh or Youngstown, full freight to destination added. We quote 1½-in. billets at $24 and forging billets at $28, base, usual extras for sizes and carbons, f.o.b. Pittsburgh or Youngstown districts, freight to destination added.

Structural Material.—The American Bridge Company has received a contract from the Kentucky & Indiana Railroad for the erection of a steel bridge across the Ohio River at Louisville, Ky., which will require 15,000 tons.

(*By Mail.*)

The better feeling in the iron trade noted in last week's report is intensified this week. It is not entirely sentimental, but is shown in an actual increase in orders and in specifications against contracts. The advance in wire products of $1 a ton came as a complete surprise to the trade, not having even been foreshadowed. The building outlook is referred to as being very satisfactory, and it is believed that 1911 is going to make a record in this line. New orders and inquiries for billets and sheet bars are better, and in finished lines there has been distinct improvement in sheets, tin plate, structural material and plates. The whole situation, in fact, is decidedly more encouraging than it has been at any time in some months. The weak spot is pig iron, and it would seem that further reduction in output must be made before any better prices can be expected.

Ferromanganese.—A sale of 200 tons of foreign 80 per cent. for delivery up to July is reported on the basis of about $38, Baltimore. We quote 80 per cent. for reasonably prompt shipment at $38 and for delivery over this year at $38.25 to $38.50. The freight rate to Pittsburgh is $1.95 a ton.

Ferrosilicon.—There is practically no new inquiry, and prices continue weak. We quote 50 per cent. for prompt shipment at $54 and for delivery over the year at about $55. We quote 10 per cent. blast furnace silicon at $23; 11 per cent. $24 and 12 per cent. $25, f.o.b. cars, Jisco and Ashland furnaces.

Skelp.—Prices are firmer and most sellers are now refusing to quote under 1.30c. for grooved steel skelp. One mill reports a sale of 1000 tons for delivery over the next two months at this price. We quote grooved steel skelp, 1.25c. to 1.30c.; sheared steel skelp, 1.30c. to 1.35c.; grooved iron skelp, 1.60c. to 1.65c., and sheared iron skelp, 1.70c. to 1.75c, all for delivery at consumers' mills in the Pittsburgh district, usual terms.

Muck Bar.—With no new demand, and in the absence of sales, we quote best grades of muck bar, made from all pig iron, at, nominally, $29.

Steel Rails.—The Carnegie Steel Company has sold 5700 tons of standard sections for export. The coal mining concerns continue to place liberal orders for light rails, but very little business is being received from the lumber interests. Quotations on light rails are as follows: 12-lb. rails, 1.25c.; 16, 20 and 25 lb., 1.21c. to 1.25c.; 30 and 35 lb., 1.20c., and 40 and 45 lb., 1.16c. The prices are f.o.b. at mill, plus freight, and are the minimum of the market on carload lots, small lots being sold at a little higher price. We quote standard sections at 1.25c. per lb.

Plates.—The Carnegie Steel Company is now receiving specifications on the contract for about 35,000 tons of plates and shapes from the Canadian Car & Foundry Company; from the Pressed Steel Car Company, specifications for about 10,000 tons of plates and shapes for the 730 cars to be built for the Pennsylvania Lines East and West, and for 4000 tons of structural material for McClintic-Marshall Construction Company, on contracts placed some time ago. The general demand for plates is considerably better, and the mills are running to fuller capacity than for some time. Prices are firm and we quote ¼-in. and heavier plates, in wide and narrow sizes, at 1.40c., Pittsburgh.

Structural Material.—The Jones & Laughlin Steel Company has taken a contract for 600 tons for the steel viaduct for the Pittsburgh & Lake Erie Railroad at Aliquippa, Pa., and the American Bridge Company has taken 175 tons for a draw span for the Louisville & Nashville Railroad and 1000 tons for three new buildings for the Crucible Steel Company of America at Newark, N. J. One of the steel barges built by the American Bridge Company for the American Steel & Wire Company has been on exhibition on the Monongahela River at the foot of Wood Street in this city and attracted considerable attention. It is the first of the 10 barges ordered, each having about 300 tons of plain material in it. Prices are firm, and we quote beams and channels up to 15 in. at 1.40c., Pittsburgh.

Sheets.—While no especially large contracts are being placed, the general demand is better and actual orders going to the mills are more numerous. Prices are being well maintained except at one or two consuming points. Taken as a whole, the sheet trade is in more satisfactory condition than for several months. The American Sheet & Tin Plate Company is operating about 56 per cent. of capacity, and the independent mills are running better than for some time. The demand for corrugated and roofing sheets is picking up in view of the near approach of spring weather, when outside building operations will be resumed. The present schedule of prices on the different grades of sheets is given in full on a previous page.

Tin Plate.—The new demand is fair, an encouraging feature being the fact that specifications against the heavy contracts placed in November and early December are coming in very freely. The American Sheet & Tin Plate Company is operating to about 76 per cent. of capacity in tin plate, showing an increase of about 25 per cent. over operations a month ago. The larger independent mills are also running to nearly full capacity. With the high price of pig tin there is little trouble in maintaining regular quotations on tin plate. We quote 100-lb. cokes at $3.60 per base box, f.o.b. Pittsburgh.

Bars.—The new demand for steel bars is fair, and specifications against contracts from the implement trade and wagon builders have been coming in more freely in the past two weeks than for some time. Shipments of steel bars by the mills this month have been heavier than in the corresponding period in December. The railroads are specifying quite freely against their contracts for iron bars, and a fair amount of new business is being placed. The demand for hard steel bars for concrete purposes is not as heavy now as it was a month or two ago, due to the cessation in building operations on account of the weather. The market is firmer. We quote steel bars at 1.40c. and common iron bars at 1.35c., f.o.b. Pittsburgh.

Hoops and Bands.—Specifications against the large contracts for hoops and bands placed in December have started to come in quite freely, and the new demand is also regarded as being better. We quote hoops at 1.50c. and bands at 1.40c., in carload and larger lots, the latter carrying extras as given in the steel bar card of September 1,

THE IRON AND METAL MARKETS

1909. On some very desirable contracts for hoops placed recently it is understood that the regular price was slightly shaded.

Spikes.—More orders are being placed for railroad spikes than for some time. The Great Northern Railroad recently contracted for 1000 kegs and the Erie Railroad for 3000 kegs with a local mill. Other orders are pending. We quote standard sizes of railroad spikes at 1.50c. to 1.55c. for Western shipment and 1.55c. to 1.60c. for local trade. We quote small railroad and boat spikes at 1.60c. to 1.65c., base, in carload and larger lots.

Spelter.—A sale of 50 tons of prime Western was made last Saturday on the basis of 5.40c., East St. Louis, or 5.52½c., Pittsburgh.

Merchant Steel.—Specifications have been better this month than in December, and orders are more numerous, but are still confined to small lots to cover actual needs. We quote, f.o.b. Pittsburgh: Iron finished tire, 1½ x ½ in. and heavier, 1.40c., base; under these sizes, 1.55c.; planished tire, 1.60c.; channel tire, 1.80c., base; toe calk, 1.90c.; flat sleigh shoe, 1.55c.; concave or convex, 1.75c.; cutter shoes, tapered or bent, 2.25c.; spring steel, 2c.; machinery steel, smooth finish, 1.90c.

Shafting.—The automobile trade is specifying more heavily against contracts than for some time, and the new demand from the implement trade is also looking up. The makers of shafting state that present conditions in this trade are better now than they have recently been, and that prices in the main are being firmly held. Discounts on cold rolled steel shafting are 57 per cent. off in carload and larger lots and 52 per cent. in small lots, delivered in base territory.

Rivets.—The new demand is a little better, but is still confined mostly to small lots to cover actual needs. Specifications against orders so far this month are better than in December. Prices are being fairly well maintained.

Wire Products.—Effective January 20, the leading wire interests announced an advance of $1 a ton. It is stated that some large contracts were placed by important jobbers prior to the advance for delivery within 60 days from date of contract. The new demand for wire and wire nails is only fair, running mostly to small lots, while specifications against contracts are being received in moderate volume. We quote galvanized barb wire at $2.05, painted $1.75, annealed fence wire $1.55, galvanized $1.85, wire nails $1.75 and cut nails $1.60, in carload and larger lots, all f.o.b. Pittsburgh, full freight to point of delivery added.

Merchant Pipe.—No large inquiries for line pipe for gas or oil lines are in the market. The general demand for merchant pipe from jobbers and consumers is fair, but is expected to be heavier next month. Some very large projects for gas and oil lines are being considered, and the demand this year for the larger sizes of pipe therefore promises to be heavy. Pipe mills are operating at present from 50 to 65 per cent. of capacity. It is stated that discounts on iron and steel pipe are being fairly well maintained.

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Boiler Tubes.—Several large contracts for locomotives are pending, and the demand for locomotive tubes promises to be more active in the near future. The new demand for merchant tubes is light, and prices are still being considerably shaded.

Coke.—A local coke operator reports having made several fairly large sales of standard grade furnace coke for delivery in the East on the basis of $1.55 per net ton, at oven. This price is a little higher than is being secured for some grades of furnace coke, which are being sold at $1.40 to $1.45, at oven, for spot shipments. Best makes of 72-hour foundry coke are being held at $2.10 to dealers and from $2.25 up to $2.50, at oven, to consumers. Several leading coke operators, including the Jamison Coal & Coke Company and Bessemer Coke Company, are understood to be holding foundry coke firm at $2.50, at oven. No large inquiries for furnace or foundry coke are in the market, but several blast furnaces now idle expect to start up in the near future, and will probably be in the market soon. We quote standard makes of furnace coke for spot shipment at $1.45 to $1.55 per net ton, at oven, while on contracts for delivery over the year from $1.70 to $1.75 is being quoted by some coke operators, while others, that are pretty well filled up, are holding their furnace coke firm at $1.90 to $2, at oven. The output of coke in the Upper and Lower Connellsville regions last week was 280,320 tons, a slight advance over the previous week.

Iron and Steel Scrap.—There is a firmer tone in prices. Most dealers are now trying to cover short sales and are finding it difficult to pick up the different grades of scrap at present prices. Several state that they could sell large quantities of scrap for delivery ahead at present prices, but are not inclined to do so, fully believing that prices on all grades of scrap will be better in the near future. There has been a fairly heavy movement in bundled sheet scrap lately, and this material is now held very firmly at about $10 at loading point. This price is equal to $10.75 to $11 delivered in the Pittsburgh district. Several sales of heavy melting scrap have been made in the past week at $13.75 delivered. Dealers quote about as follows, per gross ton, f.o.b. Pittsburgh or elsewhere, as noted:

Heavy steel scrap, Steubenville, Follansbee, Sharon, Monessen and Pittsburgh delivery	$13.50 to $13.75
No. 1 foundry cast	13.00 to 13.25
No. 2 foundry cast	12.00 to 12.25
Bundled sheet scrap, at point of shipment	10.00 to 10.25
Rerolling rails, Newark and Cambridge, Ohio, and Cumberland, Md.	14.75 to 15.00
No. 1 railroad malleable stock	12.75 to 13.00
Grate bars	10.75 to 11.00
Low phosphorus melting stock	17.00 to 17.25
Iron car axles	24.00 to 24.50
Steel car axles	20.25 to 20.50
Locomotive axles	24.00 to 24.50
No. 1 busheling scrap	12.25 to 12.50
No. 2 busheling scrap	8.75 to 9.00
Old car wheels	13.50 to 13.75
Sheet bar crop ends	15.75 to 16.00
Cast iron borings	8.00 to 8.10
Machine shop turnings	8.60 to 8.75
Old iron rails	16.00 to 16.25
No. 1 wrought scrap	14.50 to 14.75
Heavy steel axle turnings	10.25 to 10.50

Chicago

FISHER BUILDING, January 25, 1911.—(*By Telegraph.*)

The deadlock which has held back contracts for structural material was broken last week, and the fabricating interests are greatly encouraged. The contracts reported in the West foot up 31,000 tons, with a large amount of similar business pending and on the point of being closed. The liberal purchases by railroads are considered significant. In addition to the railroad items reported as closed, the Chicago, Burlington & Quincy is in the market for 3000 tons of bridge work. Manufacturers of railroad material are becoming optimistic regarding the future. There is moderate improvement in finished products of general consumption. There was no new bar business last week, but this week's specifications are coming on old contracts at a very encouraging rate, and there is more new buying. Sheet orders are also picking up, and the wire manufacturers anticipate no difficulty in maintaining their advance of $1 a ton. Buying from store is more active in all lines. Buyers are apparently becoming reconciled to the maintenance of prices and will gain more confidence when the extent of recent orders from railroads and other large interests becomes known.

Pig Iron.—The market is very quiet on both Northern and Southern grades. Chicago houses report no inquiries of moment, and business the past week has been confined to small lots for prompt shipment. The Southern furnace interests are discouraging forward purchases. Furnaces which are willing to sell for prompt shipment at a shade less than $11 are unwilling to quote this price for first half or for second quarter. A number of small lots of Southern iron have sold recently below $11, Birmingham, in this market, but in practically every case there are special conditions. Usually the iron is a little off the regular grade, but it is satisfactory to the purchaser. Transactions in off grades have formed a large part of the business done here for a long time, as the furnaces have followed the policy of piling only the regular foundry grades. It is understood that there is a shortage in the South of pipe iron, although stocks of higher foundry grades and basic are very large. The Northern furnace interests are pursuing a waiting policy and do not encourage inquiries for forward shipment. Lake Superior charcoal is quoted lower, owing to the accumulation of stocks and lack of demand. Jackson County silvery irons are also lower. Foundries at an average have enough iron bought to carry them three or four months at the present rate of consumption. Their forward buying in the past year and a half has resulted in losses to the buyer, and there is a general disposition now to wait until increased consumption makes it necessary to make forward purchases. The following quotations are for January, February and March shipment, Chicago delivery:

Lake Superior charcoal	$17.50 to $18.00
Northern coke foundry, No. 1	16.00 to 16.50
Northern coke foundry, No. 2	15.50 to 16.00
Northern coke foundry, No. 3	15.25 to 15.75
Northern Scotch, No. 1	16.50 to 17.00
Southern coke, No. 1	15.85 to 16.35
Southern coke, No. 2	15.35 to 15.85
Southern coke, No. 3	15.10 to 15.60
Southern coke, No. 4	14.85 to 15.35
Southern coke, No. 1 soft	15.85 to 16.35
Southern coke, No. 2 soft	15.35 to 15.85
Southern gray forge	14.60 to 15.10
Southern mottled	14.60 to 15.10
Malleable Bessemer	15.50 to 16.00
Standard Bessemer	17.40 to 17.90
Jackson Co. and Kentucky silvery, 6%	17.90 to 18.40
Jackson Co. and Kentucky silvery, 8%	18.90 to 19.40
Jackson Co. and Kentucky silvery, 10%	19.90 to 20.40

THE IRON AND METAL MARKETS

(By Mail.)

Billets.—The leading interest continues to maintain $31, base, Chicago, on open hearth forging billets, but independent mills have not been able to obtain better than $28, Chicago.

Rails and Track Supplies.—Rail orders booked in Chicago last week for standard sections amounted to 15,000 tons. Railroad orders for track supplies for prompt shipment are increasing, but have not yet reached the capacity of the mills. The leading interest is quoting current prices on track supplies only for prompt shipment or very short delivery periods. Higher prices are asked for deliveries extending over several months. Important developments are expected in the way of railroad buying this week. We quote standard railroad spikes at 1.65c. to 1.75c., base; track bolts with square nuts, 2.15c. to 2.25c., base, all in carload lots, Chicago. Light rails, 40 to 45 lb., 1.16c. to 1.20½c.; 30 to 35 lb., 1.19½c. to 1.24c.; 16, 20 and 25 lb., 1.20½c. to 1.25c.; 12-lb., 1.25c. to 1.29½c., Chicago.

Structural Material.—The steel contract for the Insurance Exchange Building in Chicago, 14,000 tons, was let to the Brown-Ketcham Iron Works, Indianapolis, Bethlehem shapes specified. The McNeil Building in Chicago, 900 tons, was let to the South Halsted Street Iron Works. The Lake Superior & Ishpeming Railway has given the Wisconsin Bridge Company the contract for an ore dock amounting to 5900 tons. The Chicago & Northwestern Railway has let 5000 tons of bridge work, of which the Pennsylvania Steel Company gets 2000 tons, the McClintic-Marshall Construction Company 2000 tons and the American Bridge Company 1000 tons. The St. Louis & San Francisco Railroad has let to the American Bridge Company a draw span bridge, 1000 tons, at Pocahontas, Ark. The American Bridge Company has also taken two large bridge contracts over the Sacramento River, one a highway bridge requiring 1600 tons of steel and one a street railway bridge, at Sacramento, 1300 tons. A 150-ton bridge contract of the Great Western Railroad was let to the American Bridge Company. The Missouri Valley Bridge Company was awarded 280 tons of highway bridge work in Ada County, Iowa. A building for the American Radiator Company at Denver, 350 tons, was let to the Loweth Brothers Iron Works Company. There has been a good run of small contracts recently for highway bridges and light structural work, and the fabricating interests are greatly encouraged by the prospects. One construction company in Chicago has been holding up 11,000 tons of work on which it has the general contracts, and there has never been so large a tonnage of structural business pending. We quote plain material from mill, 1.58c. to 1.63c., Chicago; from store, 1.80c. to 1.90c., Chicago.

Plates.—Specifications have been coming in better and will probably show still more improvement the coming week, as all the fabricating shops are in the market, and there are also more car orders in prospect. Miscellaneous plate business outside the structural field is satisfactory. We quote mill prices at 1.58c. to 1.63c., Chicago; store prices, 1.80c. to 1.90c., Chicago.

Sheets.—The sheet mills are lagging behind other finishing departments in the volume of new business, but prices are holding firm, and there is some improvement in the amount of new orders. The sheet mills expected a dull month in January and will not be disappointed if the improvement is slow, as long as it is steady. We quote Chicago prices, carload lots, from mill: No. 28 black sheets, 2.38c.; No. 28 galvanized, 3.38c.; No. 10 blue annealed, 1.83c. Prices from store, Chicago, are: No. 10, 2.10c. to 2.20c.; No. 12, 2.15c. to 2.25c.; No. 28 black, 2.75c. to 2.85c.; No. 28 galvanized, 3.65c. to 3.75c.

Bars.—The bar business is the dullest spot in the market. A year ago there was almost a famine in bars, and buyers were clamoring for shipments as well as for the opportunity to book orders for near deliveries. Now there is very little new business in steel bars. The bar mills, however, held up better during the fall than other finishing departments, and generally ran full until November 1. The bar iron mills are doing better but are still considerably short of a normal volume of business. We quote as follows: Soft steel bars, 1.58c.; bar iron, 1.30c. to 1.35c.; hard steel bars rolled from old rails, 1.40c. to 1.45c., all Chicago. From store, soft steel bars, 1.80c. to 1.90c.

Wire Products.—The leading interests have made a general advance of $1 per ton on all common wire products, including plain wire, wire nails, barb wire, &c. It is understood that the manufacturers of chain, bolts, rivets and other products in which wire is the raw material are considering a corresponding advance. Specifications for wire have increased 20 per cent. in the past two weeks, and a firm market with a heavy demand is anticipated for some time in the future, with the possibility of a further advance in prices. Jobbers' carload prices, which are quoted to manufacturing buyers, are as follows: Plain wire, No. 9 and coarser, base, 1.73c.; wire nails, 1.93c.; painted barb wire, 1.93c.; galvanized, 2.23c., all Chicago.

Merchant Steel.—Specifications are very satisfactory and the mills furnishing agricultural steel are running at full capacity.

Cast Iron Pipe.—It is estimated that the lettings thus far this year are just about equal to the total that had been taken a year ago up to this time. Municipalities have been a little slow in advertising their requirements, but the tonnage they specify is satisfactory. A fair amount of gas business is being booked. Water pipe lettings last week were small, but several large lettings are expected next week. On current business we quote, per net ton, Chicago, as follows: Water pipe, 4-in., $25; 6 to 12 in., $24; 16-in. and up, $23.50, with $1 extra for gas pipe.

Old Material.—The market is stagnant, with no inquiries from consumers. Rerolling rails have sold as low as $13.25 for small lots in transit. Both cast and malleable scrap are weaker. The restricted operation of malleable foundries has also depressed short steel rails. The prices quoted below are for delivery to buyers' works, all freight and switching charges paid. Sellers of scrap usually receive 50c. to $1 less in this district, owing to high switching charges. Following prices are per gross ton, delivered, Chicago:

Old iron rails	$14.50 to $15.00
Old steel rails, rerolling	13.25 to 13.75
Old steel rails, less than 3 ft.	12.50 to 13.00
Relaying rails, standard sections, subject to inspection	23.00 to 24.00
Old car wheels	13.00 to 13.50
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards, cut apart	11.50 to 12.00
Shoveling steel	11.00 to 11.50

The following quotations are per net ton:

Iron angles and splice bars	$13.00 to $13.50
Iron arch bars and transoms	14.00 to 14.50
Steel angle bars	11.00 to 11.50
Iron car axles	18.50 to 19.00
Steel car axles	17.50 to 18.00
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Steel knuckles and couplers	11.25 to 11.75
Locomotive tires, smooth	17.00 to 17.50
Steel axle turnings	7.75 to 8.25
Machine shop turnings	6.50 to 7.00
Cast and mixed borings	5.00 to 5.50
No. 1 busheling	9.25 to 9.75
No. 2 busheling	7.25 to 7.75
No. 1 boilers, cut to sheets and rings	8.00 to 8.50
Boiler punchings	13.00 to 13.50
No. 1 cast scrap	11.75 to 12.25
Stove plate and light cast scrap	10.25 to 10.75
Railroad malleable	10.75 to 11.25
Agricultural malleable	10.00 to 10.50
Pipes and flues	8.50 to 9.00

Philadelphia

PHILADELPHIA, PA., January 24, 1911.

While a better feeling prevails in both the crude and finished material markets, it has not yet been substantiated by any pronounced buying. The volume of business done during the second half of January, however, has been materially larger than that of the first half. The movement in pig iron during the week was probably less than that of the previous one, and producers in this territory promise a sharp reduction in the output in February. A trifle more business is reported in billets for prompt shipment. In finished materials a larger number of miscellaneous orders have come out. The movement in coke and old material has been comparatively light.

Iron Ore.—Importations at this port during the week ending January 21 aggregated 38,658 tons. Sellers report an absence of any negotiations which would lead to early purchases.

Pig Iron.—The movement during the week has been less pronounced. In steel making grades, which were quite active last week, but one sale, covering several thousand tons of basic for early shipment, at $14.25, delivered, was reported. A recent purchaser is in the market for 10,000 tons of basic for April-May delivery, but is holding out for a price concession. Small lots of low phosphorus iron have been sold at prices within the range of recent quotations. In the higher foundry grades business continues to drag. One large block of No. 2 plain and No. 3 foundry, which was before the trade last week, has been closed, but transactions in standard brands of No. 2 X have been confined closely to moderate lots, few exceeding 100 tons, and mostly for early delivery. Sales of Northern low grade iron to the cast iron pipe works continue to be made, one of 1000 and another of 2000 tons being reported. These interests are still in the market for further moderate quantities. In Virginia foundry irons local orders have ranged from carloads up to 100 tons

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for early delivery. Heavier sales both of the higher as well as off grade irons have been made, however, to consumers in the Virginia district. While the leading Virginia producers still maintain firmly the recent quotation of $13, furnace, for No. 2 X and No. 2 plain grades, less desirable brands can, it is reported, be had for early delivery at a concession of 25c. a ton. Several small sales of Southern No. 2 foundry to consumers in this vicinity, February and March delivery, are reported at $11, Birmingham. While there has been some demand for forge iron, buyers appear to be holding out for lower prices and no sales are reported. Plans are under way for the blowing out of at least four merchant stacks during the next 30 days. The Eastern Pig Iron Association, which met in this city last week, reported practically unchanged conditions. There was no appreciable change in the statistical position, although stocks are understood to have crept up a trifle, while unfilled orders were slightly less. The feeling that prices are at rock bottom is generally expressed by producers, who state that, rather than continue in operation at the present basis, a more general cessation of production will be made. Little interest is shown by producers in inquiries on which the delivery is extended. Sellers in a number of instances confine their quotations largely to deliveries during the next 60 and 90 days. Prices are unchanged, the following range being named for standard brands, delivered in buyers' yards, eastern Pennsylvania and nearby points, during the first quarter or, in instances, the first half of the year:

Eastern Pennsylvania, No. 2 X foundry	$15.50 to $15.75
Eastern Pennsylvania, No. 2 plain	15.00 to 15.25
Virginia, No. 2 X foundry	15.80 to 16.00
Virginia, No. 2 plain	15.80 to 16.00
Gray forge	14.25 to 14.50
Basic	14.25 to 14.50
Standard low phosphorus	21.50 to 22.00

Ferromanganese.—While there has been no fresh inquiry or buying reported in this territory, 80 per cent. ferro is being offered for prompt delivery at $38, Baltimore, and for extended delivery $38.50 is named.

Billets.—Eastern makers report a better volume of business, although sales are seldom in excess of 100 tons. There is still some inquiry for larger lots for extended delivery, although buyers are not inclined to place such business at ruling prices, which are on open hearth rolling billets $25.40 and on ordinary forging billets $30.40, delivered in this vicinity.

Plates.—A better run of miscellaneous orders is reported by mills in this vicinity, and operations have been on a better basis the past week. It is believed that with the increased volume of orders received during the second half of January the deficiency during the first half of the month will be overcome. No particularly large inquiries are reported, but the makers express more hopeful views regarding future business, and it is believed that the present demand will gradually expand. Prices for ordinary plates, delivered in this vicinity, are being firmly maintained at 1.55c. minimum.

Structural Material.—Bids for the superstructure of the Vine street pier for the city, requiring about 3000 tons of structural material, were opened last week, and it is reported that the McClintick-Marshall Company is the low bidder, but the contract has not yet been awarded. The bulk of the work in sight in this immediate district is individually small; several propositions requiring upward of 200 tons have recently come out, but the greater portion of the current orders has been for small lots. The mills, however, are taking on a larger aggregate volume of business. Quotations for plain shapes are being firmly maintained at 1.55c. minimum for delivery in this vicinity.

Sheets.—Sufficient business is now coming to local mills to enable the majority of them to operate at full capacity and to insure several weeks' work ahead at that basis. The demand shows considerable improvement, although consumers are still confining their orders to immediate or very near future requirements. Prices are firm and unchanged, Eastern mills naming the followinfi range for early deliveries: Nos. 18 to 20, 2.50c.; Nos. 22 to 24, 2.60c.; Nos. 25 and 26, 2.70c.; No. 27, 2.80c.; No. 28, 2.90c.

Bars.—Consumers have been placing orders for somewhat better quantities and for a little more extended deliveries, in some cases requirements for the first quarter and half of the year being covered. This is more particularly the case in connection with refined iron bars, which are being pretty firmly held at 1.25c., Eastern mill, equal to 1.32½c., minimum, delivered here. Not all makers, however, will meet that price, a full tenth above that figure in some instances being quoted. Steel bars are firm, at 1.55c., minimum, delivered, with business fair.

Coke.—Negotiations for moderate lots of furnace coke are still pending, consumers not being in a hurry to place contracts under existing conditions in the pig iron market. In foundry grades the demand is closely confined to small lots. Prices are unchanged, at $1.50 to $1.65, at ovens, for furnace, and $2 to $2.25, at ovens, for foundry coke. For delivery in this vicinity the following range of prices per net ton is named:

Connellsville furnace coke	$3.75 to $3.90
Foundry coke	4.25 to 4.50
Mountain furnace coke	3.35 to 3.50
Foundry coke	3.85 to 4.10

Old Material.—Transactions continue of the small lot order, with both buyers and sellers awaiting developments. Sales in but few instances exceed 200 tons, as sellers refuse, as a rule, to let go of any larger tonnage at the prevailing prices. Heavy melting steel has been sold in small lots at $12.50 and $13, depending on the grade, and it is stated that strictly first-class material is scarce, even at the top of the market. Railroad wrought and other grades of rolling mill scrap have been rather quiet, and there is little business moving in special grades. Prices, in the absence of sufficient business to establish a market, are nominally quoted in the majority of the leading grades. The following range, however, about represents sellers' ideas of the market for deliveries in buyers' yards, eastern Pennsylvania and nearby points, carrying a freight rate from Philadelphia ranging from 45c. to $1.35 per gross ton:

No. 1 steel scrap	$12.50 to $13.00
Old steel rails, rerolling	15.00 to 15.50
Low phosphorus	17.50 to 18.00
Old steel axles	19.50 to 20.00*
Old iron axles	26.00 to 27.00*
Old iron rails	17.00 to 17.50
Old car wheels	13.00 to 13.50
No. 1 railroad wrought	15.50 to 16.00
Wrought iron pipe	12.50 to 13.00
No. 1 forge fire	11.00 to 11.50
No. 2 light iron	7.00 to 7.50*
Wrought turnings	8.25 to 8.75
Cast borings	8.25 to 8.75
Machinery cast	14.00 to 14.50
Railroad malleable	12.25 to 12.75
Grate bars	11.00 to 11.50
Stove plate	10.00 to 10.50

* Nominal.

Cleveland

CLEVELAND, OHIO, January 24, 1911.

Iron Ore.—A few additional reservations are reported, but no sales, the inquiries for small lots noted last week not as yet having resulted in any business. Ore firms are getting some requests from consumers for information regarding 1911 prices, but sellers are giving the matter no consideration and will delay action until there are prospects of a fair buying movement. We quote prices as follows: Old Range Bessemer, $5; Mesaba Bessemer, $4.74; Old Range non-Bessemer, $4.20; Mesaba non-Bessemer, $4.

Pig Iron.—Sellers report a better volume of inquiry for foundry iron from the East and the Pittsburgh district. Little business is coming out, however, in the northern Ohio territory, the few sales reported being for small lots for spot shipment. Many of the foundries not already under contract for the first half either have not taken all the iron on their last quarter contracts or have liberal stocks in their yards, and efforts to interest them in new contracts are unsuccessful. The only sale of any size reported by a local interest is 1000 tons of No. 2 foundry in the Pittsburgh territory. The furnace of the Upson Nut Company, Cleveland, which was blown in recently on foundry iron will go on basic about March 1 and consequently will not be much of a factor in the local foundry iron market. The local market is firm at $14.25 for No. 2 foundry, delivered, Cleveland, for either spot shipment or contract. In the Valley prices show no improvement, No. 2 foundry being quoted at $13.50 to $13.75. For prompt shipment and the first half we quote, delivered, Cleveland, as follows:

Bessemer	$15.90
Northern foundry, No. 1	14.50
Northern foundry, No. 2	14.25
Northern foundry, No. 3	14.00
Gray forge	14.00
Southern foundry, No. 2	$15.10 to 15.35
Jackson Co. silvery, 8 per cent. silicon	19.00

Coke.—There is some inquiry for furnace coke, but mostly for small lots for spot shipment. Outside of carload orders, there is practically no demand for foundry grades. There is no change in prices. We quote standard Connellsville furnace coke at $1.40 to $1.50, per net ton, at oven, for spot shipment, and $1.70 to $1.80 for the first half. Connellsville 72-hour foundry coke is held at $2 to $2.15 for spot shipment and $2.25 to $2.50 for the first half.

Finished Iron and Steel.—The better demand for nearly all finished lines noted last week has not only kept up, but has further improved, and the feeling is becoming more general that the improved conditions will be permanent. Mill agencies not only are getting a larger volume of orders but these average larger tonnages than for some time, making

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in the aggregate quite a satisfactory volume of business. The bulk of it is in current orders, although some good steel bar specifications are coming out. Some new contracts for steel bars and structural material for the first half have been placed. Prices are firm at 1.40c., Pittsburgh, for steel bars, plates and structural material. Some good orders have come from jobbers to replenish stocks. The structural outlook is improving. The contract for the entire new plant to be built by the Ford Plate Glass Company, Toledo, Ohio, which includes several buildings, has been taken by the McClintic-Marshall Construction Company. It is estimated that it will take about 4000 tons of steel. There is an inquiry for 200 tons for a church in Canton, Ohio. The demand for sheets has improved somewhat and prices are being fairly well maintained. The local demand for wire and tin plate is quite active. Good specifications for shafting are coming out. A local frog and crossing builder has placed a contract for 2000 tons of steel rails, and an Ohio traction company has given shipping instructions for 600 tons of standard sections contracted for some time ago. The demand for iron bars is only moderate, but local mills are running at from 65 to 70 per cent. of their average capacity. Prices on iron bars are stationary at 1.30c. to 1.35c., at mill.

Old Material.—The market shows no improvement. Mills are taking some material on contracts and appear a little more willing to buy small lots. They are unwilling, however, to pay current prices. Dealers, on the other hand, have taken a somewhat firmer stand and are buying scrap at about the prices offered by the consumers. This material they plan to hold for an advance in price. There is nothing to indicate an early advance, but dealers look for a better demand and firmer prices about March 1. Dealers' prices per gross ton, f.o.b. Cleveland, are as follows:

Old steel rails	$13.75 to $14.25
Old iron rails	15.00 to 15.50
Steel car axles	18.50 to 19.00
Heavy melting steel	12.50 to 13.00
Old car wheels	12.50 to 13.00
Relaying rails, 50 lb. and over	22.50 to 23.50
Agricultural malleable	11.75 to 12.00
Railroad malleable	12.75 to 13.00
Light bundled sheet scrap	9.00 to 9.50

The following prices are per net ton, f.o.b. Cleveland:

Iron car axles	$21.00 to $21.50
Cast borings	6.00 to 6.50
Iron and steel turnings and drillings	6.50 to 7.00
Steel axle turnings	8.75 to 9.00
No. 1 busheling	10.50 to 11.00
No. 1 railroad wrought	12.00 to 12.50
No. 1 cast	11.75 to 12.25
Stove plate	10.00 to 10.50
Bundled tin scrap	11.00 to 11.50

Buffalo

BUFFALO, N. Y., January 24, 1911.

Pig Iron.—The volume of inquiry continues large and appears to be steadily increasing. The proportion of buying to inquiry, however, has been comparatively small so far this week, a large tonnage being still under negotiation. Several prospective buyers have asked for extended deliveries and quotations made for current shipment and many consumers are desirous of covering at present prices for longer deliveries than furnaces are willing to concede, sellers asking considerably higher prices for last half than for current half delivery. New business booked was chiefly for small lots although it comprised a few orders of 1000, 2000 and one of 3000 tons of foundry grades, the largest coming from cast iron pipe interests. There is a perceptible growth in consumption, judging from the fuller specifications on contracts. Pipe foundries especially seem to be preparing for larger business and taking on increased stocks of raw material. There are also increased specifications and inquiry from machinery manufacturers at New England points, the new inquiry aggregating several thousand tons. Prices continue to exhibit signs of weakness, notwithstanding the efforts of some furnaces to maintain the maximum of current schedules, and a good share of the business taken has to be at some concession. It is quite possible that deals might be put through by certain furnaces at 25 to 50 cents per ton under the appended schedule, but in a egneral way it represents the market as closely as possible. For prompt and first half delivery, f.o.b. Buffalo:

No. 1 X foundry	$14.50 to $15.00
No. 2 X foundry	14.00 to 14.50
No. 2 plain	14.00 to 14.25
No. 3 foundry	13.75 to 14.00
Gray forge	13.75 to 14.00
Malleable	14.25 to 14.75
Basic	14.25 to 15.00
Charcoal	17.25 to 17.75

Finished Iron and Steel.—The outlook is brighter with indications of a steady improvement. Specifications for immediate shipment are continuing to come out quite freely, the most noticeable betterment being in steel bars and cold rolled steel. There has been a growing feeling among consumers of steel products that the action of the makers in not reducing prices was wise, although it has not yet resulted in any buying movement for the future. Buyers realize that the mills are in a position to make prompt shipments, and there is consequently no incentive to anticipate requirements beyond immediate needs. The advance of $1 per ton on wire and wire products is producing a stimulating effect on the placing of specifications on existing contracts. The price status for other lines remains unchanged. The Canadian demand keeps up uninterruptedly, with good tonnages being inquired for and placed right along. In fabricated structural steel a good run of business is coming out, with a favorable outlook for increasing activity as spring approaches. R. T. Ford & Co., Rochester, the successful bidders for the State power plant to be built at Albany, are calling for figures covering the structural steel, which will amount to about 1100 tons. Figures are also being received for the steel for the addition to the Hammersmith paper mill to be erected at Erie, Pa., 400 tons, and for the Iroquois Hotel addition in this city, about 150 tons.

Old Material.—Shipments on contracts are now going forward to mills without restriction, and new business in most lines has improved in volume in comparison with the preceding two or three weeks. Dealers are figuring on moving scrap now, to provide yard room and funds for spring trade, and in consequence material is being offered freely for prompt shipment. The week has brought out a number of inquiries for old car wheels; also some inquiry for cast scrap for delivery over the next 60 days. We quote as follows, per gross ton, f.o.b. Buffalo:

Heavy melting steel	$12.25 to $12.50
Low phosphorus steel	17.25 to 17.50
No. 1 railroad wrought	14.25 to 15.25
No. 1 railroad and machinery cast scrap	14.00 to 14.50
Old steel axles	18.50 to 19.00
Old iron axles	23.00 to 23.50
Old car wheels	14.00 to 14.50
Railroad malleable	13.00 to 13.25
Boiler plate	10.25 to 10.50
Locomotive grate bars	10.50 to 11.00
Pipe	9.75 to 10.00
Wrought iron and soft steel turnings	7.00 to 7.25
Clean cast borings	6.25 to 6.50

Birmingham

BIRMINGHAM, ALA., January 23, 1911.

Pig Iron.—The schedule of quotations on any delivery has not been changed, but this market is generally considered stronger than at the time of last report. Of the inquiries received the past week, only a small proportion resulted in sales, and the aggregate business booked is probably less than that of the week previous. However, the selling interests have without exception manifested an indifferent attitude and to all appearances are content to await developments. The sales reported consist of 1000 tons of analysis iron for shipment over the next 90 days, at $12, Birmingham; 1000 tons of Nos. 2, 3 and 4 foundry for shipment within 90 days at $11 for No. 2, with a differential of 50c. per ton for the lower grades; 500 tons of analysis iron for first quarter delivery at $12, and an aggregate of some 900 tons in lots of 100 to 300 tons at $11, for delivery over the remainder of the first half. The most significant inquiry was for 6500 tons of Nos. 2, 3 and 4 foundry for shipment over the first half. This business has so far not been placed, as buyer and sellers are apart on prices. A lot of 2000 tons for first half delivery is also still pending, owing to the refusal of the producing interest to guarantee a certain analysis. The fact that the tonnage recently placed has gone largely to the smaller producers, owing to the reluctance with which the larger interests have submitted prices, is given considerable consideration. It is noted that two of the leading interests have been practically out of the market for some weeks and that another large concern now offers second quarter deliveries only. As far as can be ascertained, no figures have been submitted on third quarter shipments, notwithstanding the business that has been offered.

Cast Iron Pipe.—The aggregate of small orders placed within the week is quite satisfactory. It is believed that prices have been established on a firmer basis and that the outlook is such that a further advance at an early date is not unwarranted. The requirements for the piping of gas from the gas field at Fayette, Ala., to Birmingham, Ala., and Columbus, Miss., are soon to be up for consideration, but the tonnage required has not been given out. This contract has been held in abeyance for some months pending further tests in the gas field. No change in operations has been made at local producing plants, and stocks of both water and gas pipe have been materially reduced since January 1. We quote prices unchanged, as follows, per net ton, f.o.b. cars here: 4 to 6 in., $20 to $20.50; 8 to 12 in.,

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$19.50 to $20; over 12 in., average $18, with $1 per ton extra for gas pipe.

Old Material.—The sales effected in this market in the past week are considerably heavier than for some previous weeks, but without changing current quotations. Indications for a much larger consumption are general and dealers are adding to their stocks whenever practicable. The most recent movements from local yards have consisted in the main of light cast, and the total accumulation of that particular grade now in evidence is comparatively small. We quote dealers' asking prices as follows, per gross ton, f.o.b. cars here:

Old iron axles	$14.00 to $14.50
Old iron rails	12.00 to 12.50
Old steel axles	14.00 to 14.50
No. 1 railroad wrought	12.00 to 12.50
No. 2 railroad wrought	9.00 to 9.50
No. 1 country	7.50 to 8.00
No. 2 country	7.00 to 7.50
No. 1 machinery	9.50 to 10.00
No. 1 steel	10.00 to 10.50
Tram car wheels	9.00 to 9.50
Standard car wheels	10.00 to 10.50
Light cast and stove plate	8.00 to 8.50

St. Louis

ST. LOUIS, January 23, 1911.

Business men of St. Louis are gratified to note an increase of around 10 per cent. in the bank clearings the past week over 1910, for this city, Kansas City and St. Joseph. The open winter is admitting of more than the usual activity in building operations. Money is plentiful and obtainable at low rates for approved loans. Pig iron is quiet, but there is an increasing demand for metals, and the inquiry for finished iron and steel is better. Coke is quiet.

Pig Iron.—Most of the leading sellers complain of a dull market, both as to inquiries and sales. The representative of a leading Birmingham interest reports an improvement in his office over the previous week, mentioning sales aggregating 1750 tons. A large car builder is reported to be out with an inquiry for 2000 tons of malleable Bessemer. The purchase of 1000 tons each of Southern warrant iron by a couple of Belleville foundries is reported. The week's inquiries, however, were mainly for small lots, indicating a want of confidence in existing prices. It is stated that standard Southern No. 2 foundry can be bought for shipment over 60 days for $10.50, but for first half delivery $11 is asked, and for second quarter only, $11.25, f.o.b. Birmingham.

Coke.—A little better inquiry for coke is reported, but the week's sales were light; a merchant seller mentions a contract for 250 tons of Connellsville 72-hour foundry, which was the largest single transaction handled. It is reported that a by-product coke company has taken a contract for furnace coke, understood to be on the basis of $1.30 per net ton, Connellsville, establishing a new low record. The tone of the market is weaker, owing to larger offerings. We quote best selected 72-hour foundry at $2 to $2.25 per net ton, f.o.b. oven, Connellsville. Special brands are held higher.

Old Material.—It is a featureless market in scrap iron and steel. Relaying rails continue to be in good request, but for the list in general it is a dealers' market. There were no railroad offerings posted during the past week. Prices are nominally unchanged. We quote dealers' prices, per gross ton, f.o.b. St. Louis:

Old iron rails	$12.00 to $12.50
Old steel rails, rerolling	12.00 to 12.50
Old steel rails, less than 3 ft	12.00 to 12.50
Relaying rails, standard sections, subject to inspection	24.00 to 24.50
Old car wheels	12.50 to 13.00
Heavy melting steel scrap	11.50 to 12.00
Frogs, switches and guards, cut apart	11.50 to 12.00

The following quotations are per net ton:

Iron fish plates	$11.00 to $11.50
Iron car axles	18.00 to 18.50
Steel car axles	17.00 to 17.50
No. 1 railroad wrought	11.50 to 12.00
No. 2 railroad wrought	10.50 to 11.00
Railway springs	10.00 to 10.50
Locomotive tires, smooth	15.50 to 16.00
No. 1 dealers' forge	9.00 to 9.50
Mixed borings	4.50 to 5.00
No. 1 busheling	10.00 to 10.50
No. 1 boilers, cut to sheets and rings	8.50 to 9.00
No. 1 cast scrap	11.50 to 12.00
Stove plate and light cast scrap	9.00 to 9.50
Railroad malleable	8.50 to 9.00
Agricultural malleable	8.00 to 8.50
Pipes and flues	8.50 to 9.00
Railroad sheet and tank scrap	8.50 to 9.00
Railroad grate bars	8.00 to 8.50
Machine shop turnings	7.00 to 7.50

Finished Iron and Steel.—The leading interest reports more inquiry from railroads, and mentions the sale of 500 tons of standard rails to a local railroad company, with an inquiry for 3300 tons. The demand for light rails continues fair. There is a good inquiry for bars, coming mainly from manufacturers. For structural material the inquiry is only for special lots. Specifications for track material are coming in more freely.

Cincinnati

CINCINNATI, OHIO, January 25, 1911.—(*By Telegraph.*)

Pig Iron.—The comparative scarcity of low grade iron, especially in the South, is attracting attention. The pipe works and other users of this class of iron have been quiet but steady consumers and have made great inroads into furnace stocks. Producers who were reported to be making concessions in prices for prompt shipment on iron that was not quite up to standard No. 2 foundry are now said to have been cleaned out, and from all reports the price situation appears somewhat firmer. A northern Ohio melter has contracted for a good sized tonnage of Northern foundry for first half delivery. A southern Ohio consumer bought 3000 tons of basic for early shipment, and there are numerous scattered orders for smaller amounts of Southern iron, principally for prompt and first quarter delivery. Sales generally are said to show an improvement. An order for 2000 tons of malleable from a St. Louis firm is expected to be closed soon, and there is also another inquiry from a nearby concern for 200 tons of malleable. A southern Illinois firm is reported to be asking for prices in this market on a round tonnage of foundry iron for first half delivery. There are a few small lots of charcoal iron wanted and it is quoted around $24, Birmingham basis. No. 2 foundry for first quarter shipment is quotable at $11, Birmingham, and $14, Ironton, with deliveries extended through the first half at the same figure if desired. These prices are maintained for spot shipment, although there may be a few cases where commissions are divided to move some small special lots. Based on freight rates of $3.25 from Birmingham and $1.20 from Ironton, we quote, f.o.b. Cincinnati, as follows, for first quarter:

Southern coke, No. 1 foundry	$14.75 to $15.25
Southern coke, No. 2 foundry	14.25 to 14.75
Southern coke, No. 3 foundry	13.75 to 14.25
Southern coke, No. 4 foundry	13.50 to 14.00
Southern coke, No. 1 soft	14.75 to 15.25
Southern coke, No. 2 soft	14.25 to 14.75
Southern gray forge	13.00 to 13.50
Ohio silvery, 8 per cent. silicon	18.20 to 18.70
Lake Superior coke, No. 1	15.70 to 16.20
Lake Superior coke, No. 2	15.20 to 15.70
Lake Superior coke, No. 3	14.70 to 15.20
Standard Southern car wheel	25.25 to 25.75
Lake Superior car wheel	19.50 to 20.50

Coke.—There is an inquiry out for 5000 tons of furnace coke for February-March shipment, and another for approximately 1000 tons for prompt delivery, the latter from a Southern furnace operator. None of the prospective contracts recently mentioned has been closed. Some small quantities of furnace coke are being sold for domestic use. The Pocahontas and Wise County operators are maintaining prices on a firm basis for furnace coke, and for spot shipment $1.65 to $1.75 per net ton at oven is quoted, but in the Connellsville field furnace coke is said to be obtainable around $1.50 per net ton. Foundry coke is only being bought in small quantities and $2 is the average prompt shipment price, with contract figures between $2.15 and $2.25 for standard brands in all three fields.

Finished Material.—There is a better inquiry for structural material, and some business is being booked. The agricultural implement manufacturers are also holding up the demand for bars. Practically all manufacturers' agents and warehouse dealers expect a good spring trade. Reports of price cutting on the part of several independent mills do not seem to have affected this market, and mill orders are being taken on a basis of 1.40c., Pittsburgh. Warehouse quotations are unchanged at 1.75c. to 1.90c.

Old Material.—No new railroad offerings or sales are reported. Consumers appear to be taking a little more interest in the scrap market, and purchases are made to cover longer time requirements, both on the part of the rolling mills and foundries, though the latter are not now very heavy users. Prices for delivery in dealers' yards, southern Ohio and Cincinnati, are as follows:

No. 1 railroad wrought, net ton	$12.00 to $12.50
Cast borings, net ton	4.75 to 5.25
Steel turnings, net ton	6.00 to 6.50
No. 1 cast scrap, net ton	11.00 to 11.50
Burnt scrap, net ton	8.00 to 9.00
Old iron axles, net ton	17.50 to 18.50
Busheled sheet scrap, gross ton	8.50 to 9.00
Old iron rails, gross ton	14.50 to 15.50
Relaying rails, 50 lb. and up, gross ton	21.50 to 22.50
Old car wheels, gross ton	12.00 to 12.50
Heavy melting steel scrap, gross ton	11.25 to 11.75

THE IRON AND METAL MARKETS

The German Iron Market

BERLIN, January 13, 1911.

The situation in the iron market is still involved in considerable uncertainty. The chief interest of the trade has centered in the opening of bids for bars by the Railroad Administration at Hanover last week, which called out tenders at considerably lower prices than had been agreed upon by the convention for this specialty. The bids ranged as low as 107 marks, whereas the convention price is 112 to 114 marks. The iron trade and also the stock markets were not a little excited over this price cutting, and the news was made the basis for pretty heavy selling of iron shares for several days. It has been explained, however, that the low offers did not come from the mills, but from several dealers. Then the suspicion was that one of the big manufacturing companies was behind the offers, but all these have now given their word of honor that they have not taken any contracts below the convention price; and there the case rests for the present. The matter has been much discussed and has created the impression that matters are on a very uncertain basis in the bar trade, with the probabilities that the convention will not be prolonged at the meeting to be held next week for that purpose. Others, however, believe that it will be continued, inasmuch as the break down of the arrangement would cause the withdrawal of the export bounty of 5 marks a ton on bars for the foreign trade, at present paid by the Steel Works Union.

This week the stock market had a good day or two for iron shares upon the strength of an Essen dispatch which mentioned a strong foreign demand for German pig iron, especially from England, and that orders for 50,000 tons had just been placed. Considerable doubt, however, has been cast upon this dispatch, and many persons even regard it as spurious. At any rate, the regular market reviews contain nothing corresponding to its contents, though they do mention that the chief business in pig is at the moment for foreign account, and that some of this is for remoter dates. The December figures for the production of pig iron are now available, showing that it was a record breaking month, as 1910 was a record breaking year. The output in December amounted to 1,307,084 metric tons, exceeding the previous month by 35,750 tons and December, 1909, by 143,460 tons. The year's make reached 14,793,325 tons, which compares with 12,917,653 in 1909, 11,813,511 in 1908 and 13,045,760 in 1907. The prospects are that production will continue at its present level or even be increased.

The market for foreign ores remains firm, and in the Siegen district the demand is still expanding. Of course the general trade is supplied for the first half of the year, but considerable supplementary orders are coming in at the selling agency of the mines. Stocks have been so reduced that they are only about two weeks ahead of consumption. Prices are now so high for Swedish, Spanish and Mediterranean ores that many consumers are holding back and few sales are reported. High grade manganese ores are also firm, but few transactions occur owing to the high level of prices.

The market for scrap iron is somewhat weaker under heavier offers. It is reported that in some cases goods that had been sold have been left on the hands of sellers and have again come upon the market.

The shipments of the Steel Works Union in December amounted to 442,661 tons, being about 22,300 tons more than for November and 32,800 tons more than in December, 1909. The most striking thing in the December figures was the heavy gain in rails and ties. The shipments of these reached 193,324 tons, or more than for any other month since March, 1908.

Business in steel material continues at a normal level, and it is believed that it will grow still larger. It is expected that prices for the second quarter, which will be fixed at a meeting of the union next week, will be left unchanged. Considerable quantities of beams are going abroad, and the foreign market continues to buy pretty well, some of the transactions being for distant dates. In heavy plates there is still much more work on hand, but the tendency for new business is quieter. Home buyers of wire rods are rather backward in placing orders, but the foreign demand has improved and some of the buying is for long terms. There is considerable difficulty in getting satisfactory prices.

The manufacturers of galvanized sheets have just formed an organization for promoting and regulating their foreign trade. The works in question are chiefly in the Siegen region. Tin plate mills are busy and have work ahead for some time, but prices are low in view of the high level of tin prices. There is a movement on foot to increase the number of tin plate manufacturing shops by one or two. This is about the most backward department of the German iron trade, the greater part of the German consumption still being supplied by England.

The news from the Belgian iron market this week is again less satisfactory. Prices are again weakening. Foundry iron has dropped slightly. The export price for bars on board ship is about 94 shillings.

New York

NEW YORK, January 25, 1911.

Pig Iron.—Most of the buyers who came into the market soon after the opening of the year have taken some iron and the volume of inquiries before the trade has diminished. At the prices reached in the late buying melters would like to contract farther ahead than furnaces are willing to book. Considerable business was done by Buffalo furnaces for shipment into New York State and New England. Virginia iron has again been offered at $12.75, at furnace, for No. 2 X, though some furnaces hold for $13. Business in basic iron could be done if buyers' offers of $14, delivered in eastern Pennsylvania, were accepted. A sale is reported at $14.15. A New Jersey foundry has taken a second lot of 1000 tons, and is still inquiring for 500 tons. The Government is in the market for 800 tons of pig iron, including 250 tons of charcoal iron, for the Portsmouth, N. H., and Washington navy yards. We quote for tidewater delivery as follows: Northern No. 1 foundry, $15.50 to $15.75; No. 2 X, $15 to $15.25; No. 2 plain, $14.50 to $14.75; Southern No. 1 foundry, $15.50 to $15.75; No. 2, $15 to $15.25.

Steel Rails.—The order of the New York Central Lines for 1911 and its distribution are announced this week. The total is 176,750 tons, of which the Steel Corporation mills will roll 87,500 tons,, the Lackawanna Steel Company 81,250 tons and the Bethlehem Steel Company 8000 tons. Open hearth rails make up the greater portion of the order, though a large tonnage of ferrotitanium rails will be rolled at Buffalo. The lines east of Buffalo will use 82,750 tons of the total. The division among the various roads is as follows: New York Central, 55,000 tons; Boston & Albany, 15,000; Rutland, 2750; Michigan Central, 15,000; Lake Shore, 22,500; Big Four, 12,000; Peoria & Eastern, 3500; Cincinnati Northern, 3500; Chicago, Indiana & Southern, 6000; Indiana Harbor Belt, 2500; Lake Erie & Western, 5500; Toledo & Ohio Central, 6000; Pittsburgh & Lake Erie, 17,500. Other rail orders of the week are 25,400 tons for the Southern Railway, 22,400 tons to the Tennessee Company and 3000 tons to the Maryland Steel Company; 2000 tons for the Nashville, Chattanooga & St. Louis; 2800 tons for the Buffalo, Rochester & Pittsburgh, and 9875 tons for the Western Maryland, taken by the Carnegie Steel Company. A Central Western coal road has bought 4000 tons. The Delaware & Hudson has bought 3200 tons of light rails from the Pennsylvania Steel Company.

Finished Iron and Steel.—A definite improvement in conditions is reported by all lines except bar iron, which so far has not felt it. Structural material and steel bars especially are in better demand, and even plates, never very active in this territory, are taking a very fair total tonnage in small lots. Improvement has been steady since the holiday and inventory season was over, and the past week has been the best in many months. Whether the improvement is temporary or permanent business is better now than for a long time, and it is significant that mills are shying at contracts for extended delivery at present prices. Among the more important structural contracts recently closed are the following: For the McAlpin Hotel, New York, 12,000 tons, taken by the Bethlehem Steel Company; for catenary bridges for the New York, New Haven & Hartford, electrification, 2500 tons, taken by the American Bridge Company; for a bridge in Baltimore for the New York Central, 1500 tons, taken by the Pennsylvania Steel Company; for the Boston elevated railroad power house, 1360 tons, taken by the New England Structural Company; for the Brunswick Steamship Line's pier 14, New York, 1325 tons, taken by Levering & Garrigues; for the Edward Ford Plate Glass Company, Toledo, Ohio, 1200 tons, taken by the McClintic-Marshall Construction Company; for the McNeil Building, Chicago, 900 tons, taken by the South Halsted Street Iron Works; for a building for the Consolidated Gas Company, Irving place and East Fifteenth street, New York, 800 tons, taken by Levering & Garrigues; for a loft on West Thirty-third street, New York, 600 tons, taken by the Uris Iron Works; for a repair shop for the Boston Fire Department, 500 tons, taken by the Eastern Steel Company; for a New York Central bridge at Niagara Falls, 500 tons, taken by the American Bridge Company. Orders reported of less than 500 tons each, making up a total of about 2500 tons. New bids pending in New York are for two loft buildings, one of 2000 tons on Thirty-sixth street and one of 1500 tons on Broadway. Also in the market are about 9000 tons for the Kanawha Bridge for the Norfolk & Western over the Ohio River, which is awaiting Government permission to build; about 1000 tons for the Harlem prison; a 400-ton bridge

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for the Boston & Maine and six small spans for the Lehigh Valley, in addition to others previously noted on which awards have not yet been made. Prices remain unchanged, as follows: Plain structural material, plates and steel bars, 1.56c. to 1.61c., and bar iron, 1.35c. to 1.40c., all New York. Plain material from store, New York, 1.85c. to 1.95c.

Ferroalloys.—Sales of some good round lots of ferromanganese have been made in this market. An inquiry for 300 tons was filled at about $38.15 for delivery over the first half and a number of other lots were sold at very close to that price. The demand for ferrosilicon is fairly good and New York dealers are quoting $55.50, Pittsburgh, for delivery over the first half.

Cast Iron Pipe.—A number of good sized orders have been placed by private water and gas companies in the past week, for spring delivery, aggregating considerably over 10,000 tons. More business of this character has been secured by pipe manufacturers this month than in any other month for a long time. No public lettings of importance are announced. Carload lots of 6 in. continue to be quoted at $22 per net ton, tidewater.

Old Material.—More inquiries are being received than for several weeks and sentimentally the market is in better condition. Transactions have not been numerous nor have the quantities involved been large. Some sales have been made of heavy melting steel scrap for delivery in eastern Pennsylvania. The rolling mills are doing but little purchasing at present outside of wrought scrap. Cast scrap and old car wheels seem to be in most demand. The old car wheel situation is somewhat peculiar, as sales of small lots have been made to dealers as low as $11.10 in this vicinity, but the dealers are asking somewhat higher prices for what they have in stock, as they consider this class of old material a good investment at current prices, believing that they will find a considerably better market at a reasonable time in the future. Some inquiry for car wheels export has developed. Quotations per gross ton, New York and vicinity, are as follows:

Old girder and T rails for melting	$10.50 to $10.75
Heavy melting steel scrap	10.50 to 10.75
Relaying rails	20.50 to 21.50
Standard hammered iron car axles	22.00 to 23.00
Old steel car axles	16.00 to 16.50
No. 1 railroad wrought	13.50 to 14.00
Wrought iron track scrap	12.00 to 12.50
No. 1 yard wrought, long	11.00 to 11.50
No. 1 yard wrought, short	10.50 to 10.75
Light iron	5.00 to 5.50
Cast borings	6.00 to 6.50
Wrought turnings	6.00 to 6.50
Wrought pipe	10.50 to 11.00
Old car wheels	12.00 to 12.50
No. 1 heavy cast, broken up	12.00 to 12.50
Stove plate	9.50 to 10.00
Locomotive grate bars	8.50 to 9.00
Malleable cast	12.00 to 12.50

Metal Market

NEW YORK, January 25, 1911.

THE WEEK'S PRICES

Cents Per Pound for Early Delivery.

	Copper, New York.			Lead.		Spelter.	
Jan.	Lake.	Electrolytic.	Tin. New York.	New York.	St. Louis.	New York.	St. Louis.
19	12.75	12.50	{41.40 / 41.50}	4.50	4.35	5.55	5.40
20	12.75	12.37½	41.45	4.50	4.35	5.55	5.40
21	12.75	12.37½	....	4.50	4.35	5.55	5.40
23	12.75	12.37½	41.70	4.50	4.35	5.55	5.40
24	12.27	12.37½	{42.25 / 42.70}	4.50	4.35	5.55	5.40
25	12.75	12.37½	43.25	4.50	4.35	5.55	5.40

Heavy sales of copper have been made during the last three days, but at a lower price than prevailed last week. Consumers of pig tin came into the market yesterday and bought heavily at higher prices than have been paid since 1907. Lead is slightly firmer, but is not active. Buyers continue to neglect spelter.

Copper.—Following an announcement made by the United Metals Selling Company last Friday to the effect that it would accept orders for electrolytic copper delivered in the Naugatuck Valley, 30 days, at 12.50c., which made the spot price in New York 12.37½c., other sellers who had been holding out for a higher price made similar reductions, with the result that consumers came into the market and bought heavily. It is hard to estimate how much copper has been sold within the last five days, but it is generally conceded that fully 30,000,000 lb. was disposed of, and it is highly probable that the sales reached 50,000,000 lb. The liberal orders placed by consumers indicate that many of them were short of stocks, and when it is remembered that no sales of any consequence were made during October, November and December this does not seem strange. It is also apparent that consumers were determined to hold out for reduced prices, and the manner in which they conducted their buying transactions indicated that most of them were familiar enough with the statistics to warrant their belief that holders would have to make reductions to induce business. It will be remembered that there was some good trading January 16 and 17, when prices were declining, but when, on the 18th, the market stiffened to 12.50c. for electrolytic the buyers withdrew. It is the opinion that the leading sellers will continue to hold electrolytic copper at 12.37½c. until they have disposed of their surplus metal. Lake copper is firm at 12.75c. The trading during the last few days has been largely in electrolytic. The exports of copper so far this month amount to 24,012 tons. In London to-day spot copper sold at £55 7s. 6d. and futures £56 3s. 9d. The sales amounted to 300 tons of spot and 300 tons of futures. The market closed quiet.

Pig Tin.—After watching pig tin quotations advance nearly 1c. a lb. during the week, consumers in this market indulged in a buying panic yesterday which was repeated in a measure this morning. A number of them began to feel the market on Friday, but they withdrew without buying, only to find on Monday morning that quotations had advanced 25 points. They tried again yesterday and discovered that the market was soaring still further. A few orders were placed for small lots and the sales were reported, and then the consumers became frightened and a buying panic ensued that has not been equaled in this market in a number of years. Orders for fully 700 tons of tin were placed and some estimates add 300 tons more to the total sale. Buyers who took 25 or 30 tons in the morning came back and doubled their purchases in the afternoon at 15 to 25 points higher and in many cases the same purchasers were asking for more tin this morning. The London market continued to advance all the week, and it is apparent that the syndicate has full control of the situation. There are no indications of the operators showing any disposition to let go their hold, but the situation is a dangerous one for speculators. Available stocks in this country are very small as the result of the purchases of yesterday and to-day, and they are closely concentrated. There was more excited buying in New York this afternoon, when news came from London that that market had closed £2 higher than yesterday. Both spot and futures were sold at £195. The London market was described as being greatly excited, and the day's sales were large, amounting to 570 tons of spot and 1540 tons of futures. It is a significant fact that futures are bringing the same price as spot, when they are as a rule nearly £1 lower. Sales in New York were made this afternoon at 43.25c., and the market is likely to go higher.

Tin Plates.—There are better inquiries for tin plates and manufacturing consumers are taking small lots for early use. The price remains unchanged at $3.84 for 100 lb. coke plates. Quotations on foreign tin plates continue the same as last week, the price at Swansea, Wales, being 14s. 10½d.

Lead.—Very little lead is being called for, but the market seems slightly firmer than it was last week. Dealers in the West who were offering concessions have stiffened their quotation slightly. The price in New York is 4.50c., and it is selling in St. Louis at 4.35c.

Spelter.—Spelter is weaker and there are reports of concessions made for shipments from St. Louis. There is very little spelter here for spot delivery, and many sellers here are holding the metal subject to their order in East St. Louis. Consequently, while the price is 5.55c. in New York, it might be bought for a shade less than 5.40c. in St. Louis, although that market is usually 15 points lower than New York.

Antimony.—Nothing has developed from the talk of a possible trade combination among producers of antimony in Europe and the market generally has weakened, although Cookson's is still held firm at 8.25c. Hallett's can be had at 7.25c., and Chinese brands and Hungarian grades are offered at 7.25c. to 7.50c.

Old Metals.—The market is weak. Dealers' selling prices are as follows:

	Cents.
Copper, heavy cut and crucible	12.00 to 12.50
Copper, heavy and wire	11.50 to 12.00
Copper, light and bottoms	10.75 to 11.00
Brass, heavy	8.25 to 8.50
Brass, light	7.00 to 7.25
Heavy machine composition	11.00 to 11.25
Clean brass turnings	8.00 to 8.25
Composition turnings	9.00 to 9.50
Lead, heavy	4.20 to 4.25
Lead, tea	3.95 to 4.00
Zinc scrap	4.25 to 4.30

Metals, Chicago, January 24.—On recent concessions a considerable amount of copper has been placed for February and March shipment in this territory. As a result of this weakness, however, copper is quoted this week one eighth

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cent lower for both casting and lake. Tin persists in its upward course and still higher prices are asked for February shipment. Spelter is weaker, but the nominal quotations of the St. Louis market are not confirmed here. A recent inquiry for a round lot brought no offers from smelters below 4.45c., Chicago. We quote Chicago prices as follows: Casting copper 12¾c.; lake, 12⅞c., in carloads, for prompt shipment; small lots, ¼c. to ⅜c. higher; pig tin, carloads, 42¼c.; small lots, 44c.; lead, desilverized, 4.45c. to 4.50c., for 50-ton lots; corroding, 4.70c. to 4.75c., for 50-ton lots; in carloads, 2½c. per 100 lb. higher; spelter, 4.45c. to 4.50c.; Cookson's antimony, 10¼c., and other grades, 9c. to 10c., in small lots; sheet zinc is $7.50, f.o.b. La Salle, in carloads of 600-lb. casks. On old metals we quote for less than carload lots: Copper wire, crucible shapes, 12¼c.; copper bottoms, 10c.; copper clips, 12c.; red brass, 10½c.; yellow brass, 9c.; lead pipe, 4⅜c.; zinc, 4¼c.; pewter No. 1, 29c.; tin foil, 32c.; block tin pipe, 35c.

Metals, St. Louis, January 23.—Lead is very quiet and quoted at 4.35c.; spelter is dull and held at 5.30 to 5.35c., both at East St. Louis. Zinc ore is quoted at $38 to $41 per ton, Joplin base. Average conditions show open offerings below metal basis price. Tin is higher and held at 41.90c. per lb.; antimony (Cooksin's) unchanged at 8.60c.; lake copper unchanged at 13.10c.; electrolytic, 12.98c., all at St. Louis. The demand for finished metals has shown a gain each week since the new year opened.

The annual statistical report of the New York Metal Exchange for January, 1911, compiled by C. Mayer, secretary, has been issued. The volume is uniform in appearance with previous reports issued by the exchange, and contains, in addition to production figures on iron and nonferrous metals, monthly fluctuations in prices and other interesting data going back to 1905.

Notes on Prices

Rope.—Business continues to be moderate and possibly not quite up to the output of a year ago. Contractors, railroads and other large consumers are using comparatively small quantities at this time, while the demand from vessels is also light. This shrinkage in requirements, combined with less demand from merchants, accounts for the present quietness. The following quotations represent prices to the retail trade in the Eastern market for rope 7-16 in. in diameter and larger, with card advances for smaller sizes: Pure Manila of the highest grade, 8¾c. to 9¼c. per pound; second grade Manila, 7¾c. to 8¼c. per pound; hardware grade, 7¼c. to 7¾c. per pound; pure sisal of the highest grade, 6¾c. per pound; second grade, 6¼c. per pound; jute rope, ¼-in. and up, No. 1, 6c. to 6¼c. per pound; No. 2, 5½c. to 6c. per pound.

Linseed Oil.—The market in New York is strong. The country is now largely dependent for its supply of seed upon the Argentine and India crops. Another factor entering into the situation is the decrease in the consumption of linseed oil abroad, which opens the question how much of foreign seed and oil will be available for import to this country. The following quotations represent New York prices in five-barrel lots or more:

	Cents.
State, raw	94
City, raw	94

Linseed, in lots less than 5 bbl., 1 cent advance per gallon.
Boiled oil, 1 cent advance per gallon.

Spirits Turpentine.—Prices continue at a high level, owing to the strength of the Savannah market, where large interests have the situation well in hand. New York quotations in five-barrel lots are as follows:

	Cents.
In oil barrels	86
In machine barrels	86½

Less than 5-bbl. lots, ½ cent advance per gallon.

Iron and Industrial Stocks

NEW YORK, January 25, 1911.

Although a period of comparative dullness in transactions, the stock market maintained its strength fairly well the past week. Fluctuations were narrow, except in Colorado Fuel, which advanced sharply. The range of prices on active iron and industrial stocks from Wednesday of last week to Tuesday of this week was as follows:

Allis-Chalm., com	7⅛	Railway Spr., com	34¾
Allis-Chalm., pref	29	Railway Spr., pref.	95¼- 96
Beth. Steel, com.	29⅜- 30¾	Republic, com	32½- 33½
Beth. Steel, pref.	60⅜- 61	Republic, pref.	94¼- 94⅝
Can, com	9 - 9⅜	Sloss, com	50½
Can, pref	78⅜- 80	Pipe, com	16
Car & Fdry., com.	52¾- 54½	Pipe, pref.	50 - 51½
Steel Foundries	45¾- 46½	U. S. Steel, com.	76⅝- 78⅜
Colorado Fuel	32½- 36	U. S. Steel, pref.	118¼-119¼
General Electric	151 -153	Westinghouse Elec.	67 - 68
Gr. N. ore cert.	58⅛- 60¼	Va. I., C. & C.	54½- 60
Int. Harv., com.	113 -115¼	Am. Ship, com.	111¼
Int. Harv., pref.	123½-123⅝	Chi. Pneu. Tool	41⅛- 42
Int. Pump, com.	40¼- 41½	Cambria Steel	44½- 45
Int. Pump, pref.	85⅝- 86	Lake Sup. Corp.	28 - 29⅜
Locomotive, com.	40 - 41	Pa. Steel, pref.	106¼
Locomotive, pref.	110 -110⅝	Warwick	10
Nat. En. & St., com.	18	Crucible St., com.	12¼- 12½
Nat. En. & St. pref.	84¾- 90	Crucible St., pref.	75½- 76
Pressed St., com.	32 - 33½	Harb.-W. Ref., com.	34
Pressed St., pref.	94½- 95½		

The Connecticut industrial stocks, as quoted on 'Change in Hartford, demonstrate most encouraging conditions. American Hardware Corporation, New Britain, has recently advanced from 125 to 128; Landers, Frary & Clark, New Britain (par value $25), from 78 to 82; Billings & Spencer Company, Hartford (par value $25), from 40 to 41; Colt's Patent Fire Arms Mfg. Company, Hartford, from 118 to 120; International Silver Company, Meriden, from 109 to 110½; Torrington Company, Torrington, preferred (par $25), from 27½ to 28½. In a few cases a drop of but $1 per share is recorded, but the average values are high. Recent sales of local industrials at Providence, R. I., showed an equally strong condition.

Dividends.—The Cambria Steel Company has declared the regular quarterly dividend of 1¼ per cent., payable February 15.

The Torrington Company has declared a semiannual dividend of 4 per cent. on the common stock, payable February 1. An extra stock dividend of 10 per cent. was also declared on the common stock, payable to holders of record January 20.

The Plymouth Cordage Company has declared the regular quarterly dividend of 2 per cent., payable January 20.

African Copper.—From the January circular of James Lewis & Son, Liverpool, the following statement is taken: "At the annual meeting of Tanganyiki Concessions, Ltd., held December 16, it was stated that the first blast furnace at the Star of the Congo mine, producing 1000 tons of copper monthly, would be in operation in April next, and that the reduction plant, to produce another 1500 tons monthly, is now being shipped and will be started as soon as possible after the first blast furnace is in full working order, increasing the output to 2500 tons per month or 30,000 tons per annum—to be increased to 40,000 tons by the end of this year when the railroad is extended to the Kambove mine. It was further stated by the managing director that there are practically unlimited supplies of ore in the Katanga copper belt, that the amount of copper that can be produced is only limited by the time it takes for the railroads to connect with the mines, and that when the Benguella Railway is completed there will probably be an increase up to 100,000 tons from the Star or eastern end of the copper belt and of a similar quantity from the Kolwezi or western end, the cost of production delivered in Europe not exceeding £32 per ton of copper when smelting with European coke, as at present, and £23 to £27 per ton when the shorter railroad routes to the coast are available. The stock of copper at the Kansanshi mine—2000 tons—is now being shipped to England."

The Gilbert Iron & Steel Company, New York City, is involved in bankruptcy proceedings before the local United States Commission in Bankruptcy, its affairs having been complicated with several other concerns in financial difficulty.

The National Enameling & Stamping Company is to make Granite City, Ill., the home of its general offices, which have heretofore been in St. Louis. The change is made because the company's largest manufacturing plant is located at Granite City.

The Calumet Engineering Works, Harvey, Ill., will continue in operation under receivers appointed last week. All contracts and orders will be completed, pending a settlement or reorganization of the business.

The Nittany Iron Company will blow out its furnace at Bellefonte, Pa., this week, to make needed repairs.

Obituary

EDWARD B. MANNING, a founder of Manning, Bowman & Co., Meriden, Conn., died January 22, on his seventy-seventh birthday anniversary.

WALTER GRAHAM MILLER, for about 20 years connected with the Jones & Laughlin Steel Company, Pittsburgh, and for some years assistant to Roland Gerry in the cold rolled sales department, died suddenly of heart disease in Pasadena, Cal., January 16. He had been ailing for more than a year and went to California last November in the hope of recovering his health. He leaves a widow.

The Rutland Railroad Company, Rutland, Vt., of which B. A. Aikens is purchasing agent, is considering the purchase of the following machine tools: One 42-in. boring mill, similar to Pond No. 1190, and one heavy duty planer, from 8 to 10 ft. bed, standard width, both to be driven by individual motors of suitable capacity, alternating current, 400 volts, two-phase, 7200 alternations; also one heavy duty double head axle lathe, with all attachments complete, motor driven, 400 volts, three-phase, 25-cycle and one 26-in. all steel four-jaw independent chuck (for 26-in. lathe), outside step to be 1 in. high. Bids are being asked for through the purchasing department.

From statistics and estimates received by the United States Geological Survey from about 20 per cent. of the companies manufacturing Portland cement, representing nearly half of the entire output of the country, it is estimated by E. F. Burchard of the Survey that the quantity of Portland cement manufactured in the United States in 1910 was between 73,500,000 and 75,000,000 barrels, as compared with 63,508,471 barrels produced in 1909—an increase of 10,000,000 to 12,500,000 barrels, or 15 to 20 per cent.

Wickwire Brothers, Cortland, N. Y., manufacturers of woven wire products, have placed a contract with the Mesta Machine Company, Pittsburgh, Pa., for two 500-hp. producer gas engines, of the horizontal single tandem double acting four-cycle type, with cylinders 24 in. in diameter and 32-in. stroke, operating at 150 rev. per min. They will each be direct connected to a 350-kw. generator and generate the power for driving the motors throughout the plant.

Five new motor boats are under construction by the Russian Government for revenue service on the Amur River. Power equipment is to be Fairbanks-Morse three-cylinder heavy duty marine engines developing 30 hp. on kerosene. The order for these engines resulted from the sale of a 15-hp. marine engine to the Russian Government some time ago, which gave such satisfactory service that the new boats were ordered to be equipped with the same make of engine.

The Republic Rubber Company of Pittsburgh, an identified interest of the Republic Rubber Company of Youngstown, Ohio, has been granted a charter with a capital of $20,000. The new company will occupy the quarters in the Conestoga Building, at Wood and Water streets, Pittsburgh, formerly occupied by the Revere Rubber Company. Elmer E. Gallup is president; Lawrence H. Irwin, treasurer, and Millard Fisher, secretary.

The report that the Wilkoff Brothers Company, Youngstown, Ohio, dealer in iron and steel scrap, had purchased the mill of the Shenango Iron & Steel Company, at Wheatland, Pa., and would change it into a steel plant, is pronounced absolutely untrue by the former company, which states that it has no intention of taking over the property.

The furnace of the Bellefonte Furnace Company, Bellefonte, Pa., is undergoing repairs. It was blown out December 21.

More Water Power Development Needed

The Executive Committee of the National Electric Light Association, at a meeting held in New York, January 12, adopted resolutions urging that a joint commission of Congress be appointed at this session to investigate fully the situation pertaining to the public lands of the United States in connection with the development of water powers. The association represents about $2,000,000,000 invested in central stations for electric light and power and the apparatus they employ, with 100,000 employees, and includes within its ranks 90 per cent. of the investment and capacity for public service thus represented. It therefore speaks as an authority. Secretary T. C. Martin of the association says:

"There are already nearly 1000 central stations in this country using water powers but, under the present conditions that have tied up such development, very few new water power plants can be undertaken, and the result is that for lack of such utilization of such water power the consumption of coal and other fuel goes on at a rapidly increasing rate. It is to relieve this deadlock that Congress is invited to investigate fully at once all the aspects of the matter with the idea that a great many communities, particularly in the West, which are seeking to enjoy electric light, power and traction, through the development of unused water power sites, may be enabled to gratify their natural wishes in this respect. The amount of coal, oil, gas, &c., now being consumed which would be conserved by hydroelectric development on the largest scale possible literally transcends belief and is almost incalculable."

The City Council's Water Committee and the Commissioner of Public Works, Buffalo, N. Y., have approved the purchase by the city of three steam-turbo-electric generators for the equipment of the new water works from the Westinghouse Machine Company, the lowest bidder, at $248,180. In addition to providing power for pumping service, the new generators will supply current for lighting the streets and public buildings, for which Niagara power is now used.

The Drop Forging Company of New York, manufacturer of Spartan chain pipe wrenches and other special drop forgings, has purchased from the Bergen Foundry its site and buildings located at the corner of West Side avenue and Fisk street, Jersey City, N. J. The plant has a frontage on West Side avenue of 308 ft. and on Fisk street of 210 ft. and has been in operation for over two years in the same locality.

At a meeting held at the Carnegie Technical Schools in Pittsburgh, January 13, the foundry foremen of Pittsburgh and vicinity organized and elected temporary officers for the benefit and entertainment of foundry foremen visiting Pittsburgh during the convention of the National Foundrymen's Association, to be held in that city in May, 1911.

Stockholders of the Monongahela River Consolidated Coal & Coke Company held their eleventh annual meeting in Pittsburgh last week at which J. A. Donaldson, president, presented his annual report, showing the business of the company in 1910 to have been the largest in its history. The surplus, after payment of a dividend of $1 a share, was $31,232.64.

The Parkersburg Iron & Steel Company, Parkersburg, W. Va., manufacturer of iron and steel sheets and the genuine Parkersburg blue sheets, is building an addition, 100 x 200 ft., to its main mill building, in which will be installed a modern galvanizing plant for the galvanizing of its products.

The Murphy Iron Works, Detroit, Mich., has extended its selling organization in the South by opening a district office in the Empire Building, Atlanta, Ga., with Roland B. Hall in charge.

Republic Iron & Steel Company

The Executive Committee of the Republic Iron & Steel Company has issued its report for the six months ending December 31, 1910. Chairman Topping says:

"The volume of business during the six months has been disappointing. The stagnant condition of business referred to in the report for the year ending June 30, 1910, was followed by a general liquidation of iron and steel supplies in consumers' hands, and by steady declines in price, and which checked sales and restricted specifications against contracts to the buyers' necessities. General iron and steel prices are now below the 1908 panic level, many products being below the level of 1904; labor costs, however, are at the maximum, and the margin of profits unsatisfactory.

"The results of operations for the six months, on the whole, compare favorably with the same period in 1909, notwithstanding the reduction in volume of business, as increased efficiency, economy and earnings from tubular products partly offset adverse operating conditions. The open hearth steel works construction expenditures, however, have substantially increased the fixed charges, but have not added to earnings, as the new steel works will not be ready for operation prior to April 1, 1911. Full allowance for depreciation, maintenance and all other charges having been made, the net profits applicable to dividends are $1,267,850 and the amount of net assets $11,000,852."

The income account and statement of surplus for the six months, compared with 1909, is as follows:

	Six months 1910.	Six months 1909.
Gross profits	$2,632,085	$2,499,775
Maintenance and repairs of plant	680,630	598,376
Balance	$1,951,455	$1,901,399
Interest and dividends received, less interest paid	40,956	72,212
Total profit	$1,992,411	$1,973,611
Deduct—		
Depreciation and renewal of plants	300,168	312,178
Provision for exhaustion of minerals	133,511	127,684
Interest on bonds	290,882	199,357
Net profits	$1,267,850	$1,334,392
Dividend on preferred stock	875,000	794,796
Balance surplus	$392,850	$539,596

Adding surplus at July 1, 1910, which was $4,954,660, the total surplus carried to balance sheet December 31, 1910, is $5,347,510, as against $5,081,990 one year previous.

The balance sheet December 31, 1910, is as follows, with comparison with December 31, 1909:

	Assets. December 31, 1910.	December 31, 1909.
Plant, &c.	$58,212,415	$54,558,375
New construction	2,688,496	776,648
Investments in other companies	942,385	1,092,384
Prepaid royalties and expenditures	894,524	983,366
Miscellaneous	8,472	3,795
Inventories	6,956,570	5,976,982
Ore contract payments	599,582	527,279
Advances to associated companies	.....	317,700
Accounts and bills receivable	3,699,124	3,954,437
Cash	2,172,556	5,135,792
Totals	$76,174,124	$73,326,758
Liabilities.		
Common stock	$27,191,000	$27,191,000
Preferred stock	25,000,000	25,000,000
First mortgage bonds	1,647,000	7,773,000
10-30-year sinking fund 5s	8,196,000	.....
Haselton property mortgage notes	1,475,000	.....
Potter Ore bonds	325,500	334,000
Martin Coke Works bonds and notes	373,382	.....
Accrued interest	139,421	97,163
Ore contracts	188,474	186,131
Accounts payable	1,475,252	2,180,550
Haselton Steel Tube Company	.....	1,230,086
Reserve funds	*3,343,461	2,546,848
Accrued taxes	93,587	76,694
Dividend warrants	938,290	1,189,050
Dividends accrued	440,246	440,246
Profit and loss	5,347,510	5,081,990
Totals	$76,174,124	$73,326,758

* Includes fund for exhaustion of minerals, $1,365,452; for depreciation and renewals, $1,224,130; for relining furnaces, $208,091; for fire and accident insurance, &c., $403,079; for contingencies, $142,709.

The statement of unfilled orders for finished and semifinished products and pig iron is as follows, with comparisons:

	Finished and semi-finished products. Tons.	Pig iron. Tons.
December 31, 1910	293,734	76,378
June 30, 1910	341,887	82,906
December 31, 1909	457,785	39,995
June 30, 1909	392,420	94,247
December 31, 1908	391,040	89,934
June 30, 1908	283,743	59,196
June 30, 1907	448,627	74,500

The Chamber of Commerce, Butler, Pa., has issued a handsomely illustrated brochure setting forth the advantages of that city for the location of manufacturing industries. It is 30 miles from Pittsburgh, has four steam railroads and two interurban electric lines, is in a rich oil and natural gas region, and is further in a section enjoying many other natural resources needed by manufacturing interests. The largest industry the city possesses at present is the Standard Steel Car Company's works, which employs from 4000 to 6000 men. The Pittsburgh-Hickson Company, also located there, is a large manufacturer of metal bedsteads. The city has a population of 22,000 and is the center of a district having at least 30,000. It is located in the Pittsburgh freight district, and the merchants and manufacturers have the same rates as those located immediately in Pittsburgh.

The Pittsburgh Gage & Supply Company, Pittsburgh, Pa., has received a contract for piping and fittings to be used in the 5-mile gas line being laid from Montgomery to Charleston, W. Va., for the Montgomery Gas Company. It has recently received contracts for high pressure piping installations as follows: Wheeling Traction Company, Ohio State Penitentiary, Columbus Railroad Company, Girard Iron Company, Crystal Coal & Coke Company, Turkey Gap Coal & Coke Company, Pittsburgh post-office, Firth-Sterling Steel Company, McAlpine Coal Company, McKeesport Tin Plate Company, American Steel & Wire Company, Pittsburgh Brewing Company, Pittsburgh Clay Pot Company and Monongahela River Consolidated Coal & Coke Company.

The new plant of the Union Rolling Mill Company, Cleveland, was placed in operation January 16, improvements that have been in progress several months having been completed. The old 9-in. mill was abandoned, this being replaced by a Belgian mill. The new equipment includes a 14-in. roughing mill and a 9-in. finishing mill. These occupy a new building, 70 x 320 ft., with a lean-to, 40 x 140 ft. The capacity of the new mill will be about 25 per cent. greater than the one that was replaced.

Oglebay, Norton & Co., Cleveland, Ohio, have added the Old Riverton mine to their holdings in the Iron River district of the Menominee range, near Republic, Mich. The property, consisting of two 40-acre tracts, adjoins the firm's Chatham mine. The new property was formerly operated by the United States Steel Corporation, which abandoned it a few years ago. It will be gradually developed by the new owners.

The United States District Court, New York, has granted the application of A. Gordon Murray, receiver and trustee in bankruptcy of the J. B. & J. M. Cornell Company, structural iron and steel, at Eleventh avenue and Twenty-sixth street, New York City, and at Cold Spring, N. Y., to sell the entire property of the company, as the plan for a reorganization could not be accomplished.

S. H. Head, sales manager for the Samson Iron Works, Stockton, Cal., is reopening the company's San Francisco office at 501 Market street. This company is a large manufacturer of gas engines and irrigating pumps, and operates one of the largest crucible steel casting plants in the State, furnishing castings for several other machinery manufacturers.

Works Administration as a Constructive Science

Operative Methods Well Developed, but Directive Methods Still Lack Much—The Use of Standards and Records

BY H. F. STIMPSON.*

The object of civilization, physically speaking, is to provide the individual with a sufficient quantity of such of its products as he may desire. Let us see why this is not done.

We have an abundance of raw material or of productive soil; our mines are not exhausted nor is our soil cultivated to the ultimate degree of possibility. We have an abundance of equipment; the trade journals tell us that the tool manufacturers are not as busy as they might be.

We have an abundance of labor or the material from which it can be developed. There are always many persons who desire to work, yet who find no opportunity for doing so. There are many others who are physically capable of working, but who do not desire to work. Many of these are supported by the worker in some form of restrictive institution. These same workers, curiously, seem to prefer to support these people at the cost of added effort on their own part rather than to allow those so supported to earn their own living.

We have no lack of skilled methods for the operation of equipment upon the material. These have been supplied to us in abundance as the result of study and experiment, both by direct workers and, later, after being formulated, by our technical schools.

Trained Administrators Lacking

Where then is the lack? I assert that it is in the supply of trained administrators in sufficient quantity to combine all of the material, equipment and labor which are necessary for the production of the amount of the things which we need.

The reasons for this shortage are: 1. In contradiction to the plain teachings of our experience in every other line, we hold to the absurd doctrine that a manager is born, but cannot be trained; hence, 2, our system of education provides for instruction in the management of things and not of men.

Management or administration *is* an exact and constructive science which can be as well formulated and taught, without reference to the business to which it is to be applied, as can the science of mechanics. We are beginning to see that scientific management will pay when applied directly to the worker at the bench. It is even more profitable when applied to every individual through whom the efforts of the worker at the bench are directed. This science is being formulated to-day by men who have been studying it for years. They are the only source from which immediate relief can be secured; but the professional educator should bestir himself in the remodeling of the present antiquated methads, so as to meet the new demand and in order that coming generations may receive the instruction which their forefathers were unable to procure.

Standardizing as Large Corporations Were Formed

The business organization known as a corporation is as necessary and logical a resultant of the development of our civilization as are the uses of electricity. With the increase in the volume of ascertained fact it has been found impossible for any one man to acquire a sufficient knowledge of all the phases of a subject, by personal contact therewith, to draw entirely comprehensive conclusions regarding it. For this reason the collaboration of many individuals becomes necessary in the conduct of any business, and the ability to co-ordinate and direct the efforts of these individuals is as much a science as is the work of any one of them, and it is entirely distrinct therefrom. The effort of this article will be to show that it is constructive in its character.

About 1899, when the loose federations of business firms known as trusts began to crystallize into giant corporations, having complete ownership and operating from central points, it became apparent that while the ultimate power was being focused in fewer hands the resulting change in the organization, which became necessary in order to properly connect the executive with the worker, was one of kind rather than of quantity. Each of the unit businesses before these combinations took place had its individual methods and peculiarities, and so long as these affected itself only no inconvenience resulted. Subsequently it became essential that all the units should adopt one single method of performing any common act. This involved a decision as to the merits of the different methods, and some sort of a standard became a necessary prerequisite to such a decision. Mere whim or personal opinion had to stand the fire of conflicting opinion, and there was a search for a basis of sound logic upon which to erect these standards.

Possibilities, Not Records, the Standard of Effort

The determination of these standards, furthermore, necessitated a radical departure from previous habits of thought. This departure as yet has been completely made in only a few cases. The decisions necessary to the conduct of business up to that time had generally been based upon a reflective consideration of the historical records of accomplishments rather than upon a constructive consideration of future possibilities. Effort, while energetic, was then and is now largely directed toward the surpassing of previous achievements rather than toward the attainment of a definite result. It was not realized, apparently, that many data which already existed as to the possibilities within our power were but very slightly utilized. Take the case of labor: The amount of "a fair day's work" has been the subject of endless discussion, when it is really a matter of comparatively simple, though rather voluminous, calculation. Frantic guesses were and are made both by employer and employee as to its amount, and many bitter battles have been fought in consequence. Yet a day's work for a normal man can be determined with mathematical exactness, and the variations due to individual characteristics can be equitably covered by a logical application of the piece work or the task and bonus systems.

Productive and Directive Methods

In any body of men commonly engaged in organized effort the number and type of those directing the work has a direct relation to the volume and type of effort. A director needs to know, not all that the one directed already knows, but rather that which he does not know. Duplication of knowledge is highly uneconomical and is one of our material failings. This arises from the day of small things, when the master stood at the workman's elbow ready and able to take the tools and give him a direct and practical illustration of proper methods if it became necessary. This function is now performed by a demonstrator who is not even a foreman, but is purely an adviser. The higher processes of the directive function, whereby equipment and material are combined in the execution of received orders, are not now exercised directly as of old, but through the medium of a number of individuals which is, as has been said, in direct proportion to the volume and kind of the desired perform-

* Chief engineer, Universal Audit Company, Singer Building, New York.

ance. The large employer of to-day has often allowed his direct knowledge of productive methods to diminish without correspondingly increasing his knowledge of directive methods and thereby has directly lowered the efficiency of his whole organization.

No one man in the space of life allotted to him for preparatory work can assimilate complete knowledge of all the functions of a business. Some one man in the organization must, however, carry all of the responsibility. From this combination of conditions arises the necessity for individuals termed "staff assistants," who advise the executor or administrator along their especial lines in the performance of his duties. The allocation of these men and the definition of their duties and responsibilities has also been a subject of much discussion. Yet here again it is possible to determine with almost absolute accuracy the number and character of these men and their relation to the other members of the organization.

The Place of Cost Accounting

Having secured and used competent assistance in the determination of reliable standards as a guide in the issuance of his directions, the administrator next needs accurate records of the resulting performances, from which by comparison with the predetermined standards, he can ascertain the efficiency or inefficiency of his practice. This is the true function of cost accounting and much apprehension commonly exists in relation thereto. A record in itself is of but comparatively little value and cannot become so without the corresponding standard. The initial records of operations must be, so far as possible, in prime or indivisible terms. Combinations can be made later. The methods used should be such as will completely convey the necessary information to every member of the organization from the top to the bottom, and in such shape that it shall correspond to the predetermined standards. The civil engineer traces the stresses set up in each member of a bridge or other framed structure by each pound of dead or live load on its way to the ground underlying the foundations. In like manner the trained accountant traces every bit of data in its course to the successive and ultimate persons interested thereto.

The Science of Administration Applied

The reason which obtains in the conduct of any business for the collaboration of individuals of varying experience, as given at the opening of this article, applies with equal force to the conduct of the enterprise of advising business men in the application of the science of administration. The grasp of the problem must be complete in order to insure success. Piecemeal methods are exceedingly dangerous. It is, perhaps, a necessary phase of evolution in this line that many persons, actuated by the highest motives, should have endeavored and are now endeavoring to remedy the various defects in our business methods whose existence is becoming more and more apparent every day. They have attacked defects in sales methods, cost accounting and shop engineering, and have produced results which were good so far as they went, but these efforts have failed to be as completely or as permanently useful as might have been the case had they been properly correlated and adjusted to each other. This result, as in any other line of work and for the same reasons, can only be brought about by a properly designed organization embracing the necessary individual experience, operating under competent direction and, therefore, able to undertake the analysis of all details of administration from the charter of the corporation, or its equivalent, to the shipping platform and from one side of the business to the other. Such facilities are at the disposal of business men who are willing to put personal prejudice and policies aside and get down to logical deductions based on ascertained facts. When this becomes the common practice and it is realized that administration is a science which can be as well formulated and taught, without regard to the business in which it is to be employed, as can the science of mechanics, our educational methods will be improved accordingly, the era of cut and dry methods will end and the ensuing extravagant use of our resources will gradually pass into history.

The Durham Coal & Iron Company

The Durham Coal & Iron Company, James Building, Chattanooga, Tenn., has purchased and is now operating the properties of the following companies: Durham Coal & Coke Company, Sale Creek Coal & Coke Company, New Soddy Coal Company, Hamilton Coal Company, Chattanooga Company, Ltd., and Fox Coal Company. The stockholders of the new company are mainly New York capitalists, with some representation from Baltimore, Md., and London, England. C. E. James, D. P. Montague and H. S. Chamberlain of Chattanooga are also largely interested in it. C. H. Smith, vice-president and general manager, will have active management of the properties. He has for the past four years been located in Baltimore, where he has been manager of the Davis Coal & Coke Company, Western Coal & Mining Company, and Consolidated Coal Company of St. Louis.

The production of the company, which is large now, will be not less than 2,000,000 tons of coal per year, beginning January, 1912, and eventually will be increased to 3,000,000 tons. The company is the sole producer of Durham coals and foundry and furnace coke, having a high reputation. The Durham 72-hour foundry coke is sold under a guarantee to carry a greater burden than any other coke produced in the United States, to carry less than one-half of one per cent. of sulphur and not to exceed 5 per cent. ash.

The battleship Arkansas, the largest warship ever constructed in this country, was launched January 14 from the yards of the New York Shipbuilding Company, Camden, N. J. Its length over all is 562 ft.; beam over armor, 93 ft. 2⅝ in.; draft, 28 ft. 6 in.; displacement, 26,000 tons. The contract calls for a speed of 20½ knots an hour. The Arkansas will have the greatest gun power in broadside fire of any ship afloat. The main armament will consist of 12 12-in. breech loading guns mounted in six turrets. The armor belts will have an average thickness of 10 in. The vessel will be turbine driven and will have 28,000 hp. The keel was laid last January, and at present the ship is about 60 per cent. completed.

The Chicago Foundry Foremen's Association held its January meeting at the Great Northern Hotel on the evening of January 14. Prof. Fred A. Rogers of the Lewis Institute gave a demonstration lecture on wireless telegraphy, using two sets of apparatus for demonstrating the subject. At the last meeting of the Executive Committee it was decided to hold a general foundrymen's banquet at the new Sherman Hotel, on the evening of February 11. An invitation is extended to every foundryman in the Chicago district, and the association desires assistance in getting a personal mailing list of foundrymen who are not affiliated with the association.

The West Penn Steel Company, Brackenridge, Pa., has completed an addition to its sheet mill building and is installing some squaring shears and stretcher levelers. The company states that its business in full pickled, full cold-rolled, stretcher leveled and resquaring sheets has been developed to such an extent that it is unable to keep up with the demand. Its plant has been in continuous operation since it was completed in October, 1909. Having large contracts booked, the company expects to run to full capacity for some time.

The American Supply & Packing Company, Marinette, Wis., has taken over the business of the Mechanical Supply & Machinery Company of the same city under a reorganization in which more capital and fresh energy have been added. The company is engaged in jobbing mine, mill and factory supplies, steam specialties and machinery.

The Youngstown Bronze & Iron Foundry Company, Youngstown, Ohio, manufacturer of gray iron castings, pipe balls and bell dies, has recently made an addition to its foundry of 5000 sq. ft. of molding floor space, but no new equipment will be needed.

Personal

Ehrich Benjamin, who has succeeded Paul Koning as New York representative of Brandeis-Goldschmidt & Co., London, England, has been elected a member of the New York Metal Exchange.

H. H. Peck, who was recently connected with the Gary Works of the Illinois Steel Company, has been made New York representative of the New Jersey Steel Casting Company, Rahway, N. J.

Paul R. Goldey, formerly superintendent of the Camden & Trenton Railway Company, recently resigned, is now connected with the sales department of the Walker Electric Company, in its branch office, 1402 Park Building, Pittsburgh, Pa.

Charles J. Graham, secretary of the Graham Nut Company, Pittsburgh, has returned to that city from a long stay in Florida.

Carlisle Mason, vice-president and general manager of the Nelson Valve Company, Wyndmoor, Pa., sailed January 21 on a business trip, in the course of which he will visit Manchester, London, Paris, Vienna and Berlin, returning by way of Rio Janeiro, Buenos Aires, Valparaiso and other South American cities. He will be absent three months.

James V. Davidson has been appointed agent for Indiana of the National Malleable Castings Company, at the Indianapolis plant, succeeding Charles E. Brooks, who had held the position for over 20 years.

The formal presentation of the Perkin medal to Charles Martin Hall was made at the Chemists' Club, 108 West Fifty-fifth street, New York, on the evening of January 20. The presentation speech was made by Prof. Charles F. Chandler and some phases of the aluminum industry were touched upon in an address by Dr. Paul Heroult.

E. E. Kiger has been made steam engineer of the Lackawanna Steel Company, Buffalo, N. Y., succeeding the late E. P. Coleman. Mr. Kiger was formerly identified with the Cambria Steel Company, Johnstown, Pa., and was principal assistant to Mr. Coleman. He is a graduate of Sibley College, Cornell University.

Fred W. Koehler has been appointed purchasing agent of the Sharon Steel Hoop Company, Sharon, Pa., succeeding O. A. Blackburn, resigned.

M. Jackson Crispin, general manager of the United States Metal & Mfg. Company, entertained the following prominent iron and steel manufacturers and others at the Pennsylvania Society dinner given to President Taft on the evening of January 21 at the Hotel Astor, New York: James Lord, president American Iron & Steel Mfg. Company; George S. Shimer, president Milton Mfg. Company; P. S. Dyer, president American Horseshoe Company; H. H. Light, president Lebanon Valley Iron & Steel Company; E. L. Herndon, vice-president Eastern Steel Company; H. B. Spackman, purchasing agent Lukens Iron & Steel Company; L. F. Nagle, purchasing agent Worth Brothers Company; W. W. Lukens, purchasing agent Alan Wood Iron & Steel Company; W. M. Hager, secretary American Car & Foundry Company; M. B. Parker, secretary Railway Steel Spring Company; H. P. Wingert, purchasing agent American Brake Shoe & Foundry Company; L. Weimer Murray, department manager United States Metal & Mfg. Company; J. Alexander Brown, vice-president and manager Pocket List of Railway Officials.

George E. Molleson, president of George E. Molleson & Co., 50 Church street, New York, who has been seriously ill for the last five weeks, has recovered sufficiently to attend to business.

Felton Bent succeeds J. O. Entrekin as secretary of Burroughs, Sloan & Co., iron, steel and contractors' supplies, Philadelphia, Pa. Mr. Entrekin resigned to become general sales manager of the Lebanon Valley Iron & Steel Company, Lebanon, Pa.

James A. Huston, for nine years contracting manager of the Pittsburgh office of the American Bridge Company, will retire February 1 to devote his time to private interests. He has been engaged in the structural steel trade for 27 years, connecting himself in 1884 with the Smith Bridge Company, Toledo, Ohio. From 1892 to 1902 he was president and general manager of the Toledo Bridge Company, which succeeded the Smith Bridge Company. In 1902 he removed to Pittsburgh to accept the position he now leaves.

Edward Worcester, vice-president and general manager of sales of the National Tube Company, Frick Building, Pittsburgh, who has been on the Pacific Coast for a month, will be home this week.

C. C. McGrath, one of the oldest employees of the Connellsville Machine & Car Company, Connellsville, Pa., and who until recently had charge of its machine shop, is now general manager of the company. He succeeds I. C. Kelly, who recently resigned to return to his former position of master mechanic with the H. C. Frick Coke Company, Scottdale, Pa.

The Michigan Electric Welding Company is the new name of the Agnew Electric Welding Company, Detroit, Mich. Its present location is at the corner of Third and Congress streets. The new quarters consist of a one-story brick building, 35 x 60 ft., having in the rear a two-story building approximately 25 x 65 ft. In addition to this, there is a large storeroom. The company has added additional machinery, and is now in excellent shape to handle job welding and manufacturing for the trade in its territory. A specialty is being made of automobile work. Rod and yoke end assemblies are furnished complete, and other parts, such as the welding of tubular reach, torsion and radius rods, torque tubes, drag links, fore and aft connections can be furnished. The welding of propeller shafts and any other sort of forgings and parts that can be welded to rods, shafts or tubes or other job welding will be undertaken. Operators of long experience in electric welding are employed, which will insure the reliable work which is not only desired but is of such great importance in electric welding.

The Chester B. Albree Iron Works Company, Pittsburgh, has completed the manufacture of six power riveting machines to be shipped to Seattle, Wash. The riveters are of assorted sizes, and each is equipped with a universal bail, which permits operating the machine at any angle desired. The company has also completed the manufacture of an automatic toggle joint riveting machine for the William B. Scaife & Sons Company, Pittsburgh. The machine is regulated automatically to rivet the thickness desired, eliminating entirely hand adjustment. The structural steel department of the plant is engaged on the manufacture of about 2 miles of railing for bridge work at Kansas City, railings for the Ohio River bridge at Sewickley, and the ornamental iron and stair work for the Haugh & Keenan nine-story warehouse in course of construction on Center avenue, Pittsburgh.

The Elmer P. Morris Company, Elizabeth, N. J., and the Frederick Iron Works, Frederick, Md., were consolidated January 21 under the name of the Morris Iron Company, which is capitalized at $175,000. Operations will hereafter be carried on at the Frederick foundry and work will be commenced at once on an addition there comprising 61,000 ft. of floor space. John Mitchell, Jr., is president; E. P. Morris, vice-president and general manager; C. C. Biser, treasurer, and W. T. S. Diven, superintendent.

W. E. Corey will sail for Europe about March 1 for a stay of four months. On returning in July he will have offices in the Hudson Terminal Building, 30 Church street, and will remove to the Bankers' Trust Building on its completion next year.

The Ryder Brass Foundry Company, Bucyrus, Ohio, has been incorporated under the laws of that State. The company manufactures brass, bronze and aluminum castings, manganese and phosphor bronzes and special alloys.

The Machinery Markets

Machinery buying is gradually increasing throughout the country. The railroads are asking for small lots of machine tools in the New York market, and the Boston & Maine Railroad is out with a good sized list of machinery on which the New England trade is bidding. Automobile manufacturers are also placing considerable business in New England, and there is some good buying in sight there from other sources. Scattered inquiries from the railroads, together with a fair-sized list from the Pennsylvania Railroad, contribute to the slightly better feeling among Philadelphia machinery interests and an increasing volume of business is noted in Pittsburgh. Some improvement is noted in Cleveland, where announcement is made that the American Steel & Wire Company has placed an order for $50,000 worth of tools for its plant at Corey, Ala. Inquiries are increasing in Cincinnati and Detroit. In the Farther Central West makers of automobiles and gasoline engines are exceptionally busy. There is a revival of trade in the Southwest, where orders from smaller manufacturing plants predominate. The opening of new industrial railroads and extensions to the present systems is bringing good trade to Southern machinery dealers. Second-hand machinery is in especially good demand in that territory.

New York

NEW YORK, January 25, 1911.

The machinery trade continues to improve in New York and railroads are coming into the market for small lots of machine tools in a manner to indicate that a moderate buying movement from that direction is on. The Erie Railroad is asking for bids on gear cutters for its shops at Meadville, Pa., and the Delaware & Hudson Railroad is out with a small list. The Pennsylvania Railroad also has a small list in the hands of dealers. There are inquiries from the mechanical departments of a number of Southern railroads that promise to result in some buying. A Pennsylvania electrical equipment manufacturing company is investigating the machine tool situation with a view to making extensive purchases, and there are increased inquiries from the general manufacturing field. Some good business has come into two markets of late from the silk mills in and around Paterson, N. J., chiefly in the way of power equipment and mill supplies. The call for second-hand machinery and especially for certain types of used machine tools is so good that regular dealers in that line of equipment are searching about to buy machines for resale and for stock. Export business continues to give excellent support to the market and some good buying has been done for machines to be delivered in Great Britain, Germany and Italy. German manufacturers of railroad equipment have been generous purchasers of machine tools and hot metal working machinery.

The Delaware & Hudson Railroad has a small list of machine tools out which may be the forerunner of a larger list. For the last two years the company has been planning in a general way to erect large additions to its car repair plant at Green Island, N. Y., as well as the improvements at Watervleit outlined in these columns last week. It is understood that the plans include a structure 800 ft. long, which will be used as a general machine shop. From all accounts plans for the building have been practically concluded, but the equipment on which bids are now being asked for may be wanted for the present plant at Green Island. The list includes one 5-in. semiuniversal radial drill, one 16 ft. by 10 in. bed toolmakers' lathe, one 20-in. slide back geared pillar shaper, one 20-in. double spindle bolt threading machine and one No. 4 high power milling machine.

The Lauter Piano Company, Morris and Essex Railroad avenue, Newark, N. J., has disposed of its plant to the Westinghouse Company and will build a much larger factory on Sussex avenue, Newark. Plans for the new building are now being prepared. The Westinghouse Company will use the Lauter factory to increase its manufacturing facilities.

The Grasselli Chemical Company, 60 Wall street, New York, has acquired a plot of land of about 54,000 sq. ft. in Newark, N. J. The property is on Passaic avenue along the line of the Central Railroad of New Jersey. It is understood that the company will build a plant there, but no announcement of the size of the buildings has been made as yet.

The Rubber & Celluloid Harness Trimming Company, 54-56 Ferry street, Newark, N. J., has awarded a contract to Frederick Phelps of Newark, as engineer, for the erection of a five-story fireproof building, 40 x 70 ft., as an addition to its plant. The building will be of brick and reinforced concrete construction.

The Water Power Vacuum Cleaning Company, 730 Main street, Buffalo, N. Y., has been incorporated, with a capital stock of $50,000, to manufacture vacuum cleaning apparatus. Arrangements are being completed for a manufacturing plant. C. C. Trow is president; H. C. Redfern, treasurer, and J. P. Clifton, secretary.

The Bison City Table Company, Buffalo, N. Y., which recently sold its three-story factory at 1490-1496 Jefferson street to the Buffalo Receptacle Company, is arranging to build and equip a new plant at Scoville avenue and the Pennsylvania Railroad. Arthur J. Kreinheder is president, 10 Scoville avenue.

The Nye Company, Buffalo, N. Y., has been incorporated, with a capital stock of $10,000, to take over the business of Geo. B. Nye, 44 Henry street, and continue the manufacture of safety devices for saws, shapers and other woodworking machinery and also for stamping machinery. The officers of the company are Geo. B. Nye, president and treasurer; Walter Devereaux, secretary.

The Central Star Laundry Company, Buffalo, N. Y., will build and equip a 90 x 100 ft. addition to its plant at Masten street and Northland avenue.

The Empire State General Vehicle Company, Rochester, N. Y., will erect a building on Circle street, 48 x 212 ft., two stories, to be used as a distributing plant.

The Loritz Tenscher Company, Utica, N. Y., will soon receive bids for a one-story steel frame factory building, 160 x 160 ft., which it will erect on Lincoln avenue, the estimated cost being $60,000.

The Rome Wire Company, Rome, N. Y., has plans completed for a one-story mill, 100 x 134 ft., steel frame construction, which it will add to its plant early in the spring.

The Alberger Gas Engine Company has been incorporated at Buffalo, N. Y., with a capital stock of $221,000, for the manufacture of gas engines. It will take over the business of the A. H. Alberger Company and will establish its plant and main office at Buffalo. Among the directors are Charles H. Taylor, Louis E. R. French and I. G. Holender. Offices, 695 Ellicott Square Building, Buffalo.

The Linde Air Products Company, Buffalo, N. Y., of which Cecil Lightfoot is general manager, will build a branch plant at Trafford, Pa., in addition to branch factory at South Elizabeth, N. J., for which bids are now being received. Steel and brick construction will be used for both of the new plants the estimated cost of each being $40,000.

The Automatic Transportation Company, Buffalo, N. Y., will establish its Canadian branch plant at Welland, Ont. A site has been secured adjoining the works of the Canadian Iron & Steel Company and plans completed for a brick and concrete factory building to be erected there.

Catalogues Wanted

Silver Brothers Iron Works Company, Salt Lake City, Utah, is arranging a catalogue library and desires trade literature relating to the metal industry.

The Southern Tool & Machine Company, 5 East Main street, Chattanooga, Tenn., formerly known as the J. W. Gore Company, desires latest catalogues from manufacturers of machine tools, planing mill and pattern shop machinery and machinists' supplies. While the name of the company has been changed, the ownership continues the same.

Chicago

CHICAGO, ILL., January 24, 1911.

The Chicago machinery trade is making fair progress and a moderate amount of business is being closed, although conditions have not yet reached a basis satisfactory to the majority of the dealers. Two small shop lists were closed last week in the West, the business being taken by Chicago houses, and there is a good run of scattering inquiries and sales. Apparently the machine tool business has been keeping pace in the past six months with the general iron and steel business. The conditions which have caused hesitation among industrial buyers in placing forward contracts for iron and steel have had a corresponding effect in check-

THE MACHINERY MARKETS

ing plans for additions or improvements in old shops as well as the organization of new companies. The indications of a favorable turn in the steel industry are expected to bring a corresponding improvement in the demand for iron and steel working tools. The recent decline in interest rates and easing up in the money market will encourage plant investments. This is also favorable for the railroads, as it will enable them to sell bonds and make financial arrangements for new construction.

The Orton & Steinbrunner Company, Chicago, has recently closed the purchase of about $15,000 worth of machine shop tools for a new plant at Huntington, Ind.

The Joliet Wheel Mfg. Company, Joliet, Ill., advises that it will in all probability rebuild its plant which was destroyed by fire on January 13. The company will be in the market for boilers, wood working machinery, tools and other necessary equipment for the manufacture of wooden wheels.

The Swanson Mfg. Company is now located in its new plant at Marseilles, Ill., where it has greatly increased manufacturing facilities. All correspondence should be sent to the new address in the future.

The Quincy Gas, Electric & Heating Company, Quincy, Ill., is considering plans for improvement of its electric power house. About $50,000 will be expended.

The City Council of Naperville, Ill., is preparing to improve its electric light plant.

The C. Ehman Company, Decatur, Ill., whose plant was destroyed by fire on the night of January 7, entailing a loss of approximately $200,000, including $75,000 worth of new machinery, advises that its plans for the future are still unsettled excepting that it is arranging to resume operations at the earliest possible time.

J. Burroughs, of Yale, Iowa, and M. E. Beckstrom, of Moline, Ill., have purchased the rights from the National Rubberette Company, Davenport, Iowa, to install a rubberette plant at Springfield, Ill., and will erect a $10,000 plant there.

The Commercial Club of Belleville, Ill., has closed a deal with the Joan d'Arc Mfg. Company, St. Louis, for the location in Commercial Place of one of its plants for the manufacture of steam valves, school globes and ice manufacturing plants for residences. A bonus of 10 acres of ground has been given the new concern. A building, 80 x 585 ft., is to be erected.

The T. J. Derwent Company, Rockford, Ill., has been incorporated with a capital stock of $10,000. The incorporators are T. J. Derwent, Luther Derwent and Alaline Derwent. The company will operate a planing mill.

Philadelphia

PHILADELPHIA, PA., January 24, 1911.

In some instances a shade more business has been recently done, but the majority of machine tool merchants report the demand as being light and confined principally to small and single tool propositions. There has been some scattered inquiry from the railroads, particularly the Pennsylvania, which has been asking for bids on a few tools for one of its shops, but there is as yet no general demand from this class of buyers. There is a more confident feeling in the trade generally, and, while no pronounced betterment in the demand was anticipated during January, it is expected that business will show an increased volume in the near future. Several fair propositions, which have temporarily been held in abeyance, are expected to develop into business; in fact, some preliminary buying is to be noted on the part of one interest which had quite a good list under consideration something less than a year ago.

Some manufacturers report a trifle larger volume of new business, particularly in equipment of a special nature, but orders are not large individually and few are from buyers in this immediate vicinity. Little demand for tools for export is reported.

Second-hand machinery and tool merchants find the demand irregular and the class of equipment inquired for varied. Heavy engine builders still report a slow development of pending negotiations, although a fair volume of business is under contract. The demand for second-hand power equipment shows little betterment.

The A. P. Whitman Company has completed the building of additions to its forging plant at Chester, Pa. A large quantity of machinery has been acquired and about 50 per cent. is now installed. The new addition is expected to be in full operation by March 1.

The Pennsylvania Railroad has been taking bids for a 60-in. and a 24-in. lathe, a 1½-in. double staybolt machine, a hydraulic press, a pipe cutting machine and an electric crane. The bulk of this equipment is understood to be for its Trenton shops.

The Hamburg Broom Works, Hamburg, Pa., will erect an addition to its plant the coming spring. The new building will be 60 x 300 ft. No additional power equipment will be required, as electricity supplied either from its present plant or from the Hamburg Electric Company will be used.

Plans are being considered in connection with the rebuilding of the plant of the Catawissa Car Company, Bloomsburg, Pa. Several weeks will elapse, it is stated, before any decision in the matter will be reached.

The Turner-Forman Company is understood to have a contract to erect a 10-story reinforced concrete manufacturing building, 71 x 193 ft., on Twelfth street between Wood and Pearl streets, for John H. Smaltz, to be occupied on completion by the Smaltz-Goodwin Company, manufacturer of shoes.

The Bergner & Engel Brewing Company will erect a one-story boiler house and coal and ash bunker, of steel and reinforced concrete, about 42 x 74 ft. The contract for the building has been awarded to Matthew Schmid.

The Parker Boiler Company, Pennsylvania Building, is looking for a plant suitable for the manufacture of boilers and plate metal work, which it will buy or lease. The plant must be a going concern with at least $200,000 annual business and a good manufacturing organization. The purchase is to be made at a fair appraised valuation.

The Chadwick Engineering Company, automobile manufacturer, Pottstown, Pa., expects to occupy its new plant within the next three months. The buildings have been practically completed. Plans for an electric power plant are now being considered, and this equipment will be later installed; in the meantime current will be supplied by local power producers. While nothing has been definitely decided upon in the way of new equipment for its enlarged plant, we are informed, additional tools will no doubt be required. This company reports that the demand for 1911 Chadwick automobiles is opening very satisfactory, and a growing export demand is noted.

The Pennsylvania Shafting Company, Spring City, Pa., whose round drawing department was destroyed by fire late in December, 1910, has completed the erection of a temporary structure and will start operations again during the present week. The damage to its power house has been fully repaired. A new brick and steel building for its round drawing department, 75 x 185 ft., on the site of the destroyed building, will be erected at an early date; plans are now being considered. For the equipment of the new building cranes and possibly other equipment will be required.

The plant of the Oliphant Steel & Iron Company, Trenton, N. J., has been sold to the National Radiator Company, Johnstown, Pa. It is the intention of the purchaser to equip the Trenton plant for the manufacture of its line of radiation. This, the latter company informs us, will necessitate an addition to the buildings and alterations to the present plant. It is hoped to get at least part of the new plant in operation by May. The main office of the National Radiator Company will be continued at Johnstown, Pa.

The limited partnership between Louis J. Bergdoll and George F. Pawling, under the name of Bergdoll & Pawling, engineers and contractors in iron and steel, has been dissolved and will be succeeded by a corporation to be known as George F. Pawling & Co., for which a charter under the Pennsylvania laws, with a capital stock of $25,000 will be applied for February 14. The incorporators are Louis J. Bergdoll, George F. Pawling, Walter D. Stewart, George M. Beatty and Philip S. Tyre.

Cincinnati

CINCINNATI, OHIO, January 24, 1911.

The machine tool trade continues to feel encouraged over the inquiries coming in, but the aggregate of orders booked does not meet expectations. The railroads in this section have been buying sparingly and reports to the effect that several large purchases of machine tools were quietly made recently do not appear to be well founded. Not only railroad officials, but the manufacturing interests generally are openly impatient over the delay in settling the freight rate question. A decision in this matter will undoubtedly stimulate business all over the country, as under present conditions railroad officials do not know where they stand, and with some roads, the operating departments have become wearied of putting in requisitions for tools and equipment that are not passed on.

One very encouraging matter is the large number of new incorporations in the central West for manufacturing companies, as well as the additions to capital stock of several firms to take care of contemplated increases in the capacity of their plants.

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The Ohio Corrugated Culvert Company, Middletown, Ohio, announces the increase of its capital stock from $65,000 to $100,000. The capacity of its plant will be greatly increased, and one of the new proposed buildings will be used for manufacturing portable houses made from American ingot iron, rolled by the American Rolling Mill Company of Middletown.

The annual meeting of the American Tool Works Company, Cincinnati, was held January 17, and all the old officers and directors were re-elected. Franklin Alter is president; J. B. Doan, vice-president and general manager; Harry Luers, treasurer, and Robert S. Alter, secretary and advertising manager. Business received during the year 1910 was reported as showing a very satisfactory total.

To manufacture buggies, the M. F. Carroll & Sons Company has been incorporated at Hillsboro, Ohio, with $25,000 capital stock. The incorporators are M. F. Carroll, J. E. Carroll, E. P. Carroll, C. L. Carroll and J. W. Carroll.

The Queen & Crescent Railroad Company, A. Telford, purchasing agent, Cincinnati, has out a requisition for one combination punch and shear, with 48 in. depth of throat; one bolt heading machine, and one self-feed rip saw.

The Massillon Foundry & Machine Company, Massillon, Ohio, has published an increase in its capital stock from $50,000 to $100,000.

The Victor Lamp Company, Cincinnati, completion of whose plant was recently announced, has been incorporated with $100,000 capital stock, by William J. Cocoran, John L. Cocoran, Edward B. Cocoran, John Galvin and H. R. Kerans.

The Barnard Carburetor Company, Dayton, Ohio, has been incorporated with $100,000 capital stock, to manufacture hydrocarbon engines. The incorporators are Davis Barnard, R. L. Stauter, I. M. Haas, C. J. Smith and C. L. McCrea.

The Toledo Plate & Window Glass Company, Toledo, Ohio, recently increased its capital stock from $100,000 to $300,000, and there is an unconfirmed report that some extensions to its plant are contemplated.

The recently mentioned sheet metal plant of Kirk & Blum, Cincinnati, will be located at the corner of Western avenue and York street, where this firm has acquired a site. Construction work will begin as soon as the building plans are completed.

The Triumph Electric & Ice Machine Company, Oakley, Cincinnati, has just closed contract for four of its 40-ton ice machines to be shipped the Canadian Fish Company at Seattle, Wash. The Triumph Company has recently opened a sales office at 728 Poydras street, New Orleans, La., which is the sixteenth outside sales office now being maintained by this company and the third to be opened during the past year. A large stock of motors and generators will be carried at the New Orleans station to fill orders calling for prompt shipment.

The Clark Gear Company, Elkins, W. Va., has been incorporated, with $20,000 capital stock, to manufacture the Clark patented automatic gear. The incorporators are P. E. Clark, Mary R. Clark and R. Chaffey of Elkins, and L. C. and E. K. Dyer of Hambleton, W. Va.

It is reported that the Petersburg Lumber Company, Petersburg, W. Va., will erect a sawmill in Grant County of that State. The company was recently incorporated, with $25,000 capital stock, by Luther Stratford, Charles N. Finnell of Keyser, W. Va., and E. E. and Charles Fout of Laurel Dale, W. Va.

Cleveland

CLEVELAND, OHIO, January 24, 1911.

Inquiries in the Cleveland machinery market have improved. While actual orders are still somewhat light, more business was done the past week than the previous one. Dealers generally report an improvement over December. One fairly good sized order was placed with local dealers during the week, but sales were mostly of single tools. The American Steel & Wire Company placed its order for the machine tool equipment for its new plant at Corey, Ala., for which an inquiry was sent out last fall. This business, amounting to about $50,000, went to a Birmingham dealer.

Reports from manufacturers indicate that inquiries with them show more improvement than those received by dealers. A local manufacturer of forge shop equipment reports inquiries above the normal. Inquiries for drilling machinery have also picked up considerably. The automobile trade is buying a little more freely and if business starts out as expected in this industry in the early spring a fair volume of orders is looked for from this source. Recent purchases have been largely due to different machines being needed in getting out new models. The prospective business is in equipment to reduce the cost of production rather than to increase capacity, and it is expected that it will be more in special machinery than in standard tools.

The General Fire Extinguisher Company will enlarge its plant at Warren, Ohio, by the erection of a brick and steel factory building, 150 x 350 ft., the contract for which has been placed with the Woods Construction Company of Detroit, Mich. A portion of the building will be used for pipe storage purposes and the remainder for a machine shop. An electric crane will be installed as well as other machinery.

The Avery Company, Cleveland, has been incorporated with a capital stock of $150,000. It is stated that the company was formed to manufacture dies and machinery, but names of the men interested and announcement of the plans are withheld until the project assumes more definite shape.

The Carroll Foundry & Machine Works, Bucyrus, Ohio, will enlarge its plant with an addition to its machine shop. The new building will be 82 x 212 ft., of steel construction. A 20-ton crane, to run the length of the building, and other new machinery will be installed. Later an extension to the foundry is planned.

The Mebane Mfg. Company, Cleveland, has been incorporated, with a capital stock of $10,000, by C. P. Mebane and others, to make foundry facings and other products. The company will have an office at 6110 Euclid avenue and will have a plant in the rear of that number.

The Ceramic Improvement Company, Alliance, Ohio, has been incorporated, with a capital stock of $10,000, to manufacture devices used in the ceramic industry. The incorporators are J. F. Kryder, T. F. Bailey, C. W. Casselman, A. B. Love and M. R. Broadhurst.

The Economy Automatic Mine Door Company, Canton, Ohio, has been incorporated, with a capital stock of $5000, to make automatic mine doors. The incorporators are John Wack, J. C. Skelton, H. E. Vankirk, J. J. McCall and S. F. Bowman.

The Peterson-Brown Company, Mansfield, Ohio, with a capital stock of $10,000, has been organized to make locks, &c., by John F. Peterson, Edward N. Brown and others.

The Morton Tractor Company, Fremont, Ohio, expects to build a new plant. A number of propositions to locate in other northern Ohio cities have been made to the company and a site has not yet been decided upon.

The Fremont Stove Company, Fremont, Ohio, which recently acquired the June foundry plant in that city, has completed the necessary alterations and the plant is now being placed in operation.

The Southern Naval Stores Company, Toledo, Ohio, has been incorporated, with a capital stock of $25,000, by Sigmund Sanger, K. A. Kaley and others. It is stated that the company will build two plants, one in Florida and the other in Georgia, to extract resin and turpentine from pine stumps.

The Firestone Tire & Rubber Company, Akron, Ohio, has gone into the manufacture of automobile and carriage rims, in addition to making tires. The company has placed in operation a complete rim plant adjoining its present tire plant.

The American Farm Machinery Company, in which William N. Whitely and others are interested, is equipping a large plant in Lancaster, Ohio, for the manufacture of farm implements. Considerable machinery has been moved to the new plant from the old Co-operative plant in Springfield.

The Ralston Steel Car Company, Columbus, Ohio, has increased its capital stock from $1,000,000 to $2,500,000.

The Iceless Icebox Company, Cleveland, has been organized by A. B. Smythe and others, with a capital stock of $20,000, to make sheet metal boxes to be placed outside of windows, taking the place of a refrigerator during cool weather.

The Kelly Gypsum Company has been formed at Sandusky, Ohio, and, it is announced, will build a $75,000 gypsum plant near that city. The incorporators are S. C. Kelly, W. L. Allendorf, J. B. Swift, Paul H. Sprow and George C. Beis.

The Hoffman Heater Company, Lorain, Ohio, is erecting an addition to its plant, 32 x 75 ft., to be used as a storeroom.

Detroit

DETROIT, MICH., January 23, 1911.

Not only machinery dealers but business men in many diverse lines state that the outlook for the coming year is very encouraging. Construction, beginning with the first open weather, cannot fail to be uncommonly heavy, as the number of plans now in the hands of architects and builders shows.

The Swedish Crucible Steel Company, Detroit, has intrusted the preparation of plans for its new foundry to R. E. Raseman, Penobscot Building.

Interests identified with the Colton Company, Detroit, are planning the erection of a new plant in which to manufacture special machinery, the nature of which is not stated.

THE MACHINERY MARKETS

The Riverside Machinery Depot, Detroit, has had a fair run of inquiries this month for second-hand machinery for both metal and woodworking plants, as well as boilers, engines, pumps, electric motors, power transmission apparatus and other equipment for a wide range of industrial service.

The municipal authorities at Muskegon, Mich., have engaged an engineer here to prepare plans and the complete specifications for an electric plant of about 1000 kw. capacity.

The American Stamping Company will build a plant in Battle Creek, Mich., for the manufacture of grease and oil cups used in automobile and similar service. The stock of the company is held principally in Mendon and White Pigeon.

Interests identified with the Cartier Lumber Company, Ludington, Mich., acquired the water power property at Hamlin Lake and will build a new plant, including concrete dam, to supply electric current for industrial power and lighting in Hart, Hamlin and Pentwater, Mich.

The Alpena Motor Car Company, Alpena, Mich., is taking measures to increase its output, particularly in the body making department.

The Eastern Michigan Edison Company has had plans drawn by its division engineer at Rochester, Mich., H. W. Hall, for a steel and concrete power station, 230 x 208 ft., at Amy, Mich. The details of equipment have not yet been fully determined upon.

The Battle Creek Industrial Association, Battle Creek, Mich., is endeavoring to secure the construction there of a plant for the manufacture of hot water furnaces by the Finlayson Heater Company, Detroit. It is reported that a definite proposition is now being considered.

Plans for the new pumping station in Holland, Mich., are in course of preparation.

Steps are being taken to rebuild the plant of the Holly Electric Light & Power Company, Holly, Mich., whose destruction by fire was recently reported.

The Christie Kline Forge Company, Detroit, has been incorporated.

The lumber mill of W. A. Hosmer, Bellaire, Mich., which burned about two weeks ago, will be rebuilt and equipped with modern power and sawing machinery.

The Paige-Detroit Motor Car Company has increased its capital stock from $100,000 to $250,000, in order to provide for the extension of the business, as necessitated by recent orders. The company's manufacturing facilities in Detroit and elsewhere will be enlarged.

An additional pumping engine, to be installed in the water works station as a reserve unit, will be purchased by the city of Grand Rapids, Mich.

A new corporation at Muskegon, Mich., is the Wright Cooler & Hood Mfg. Company, organized for the production of the automobile accessories named.

The factory of the Hunt Show Case Company, Detroit, was damaged by fire last week, but not sufficiently to require any new machinery.

The Manistee Iron Works, Manistee, Mich., is considering plans for an extension of its plant, which will provide for an increase in its working force of at least 200 men. It is proposed by the city authorities and local Board of Trade to furnish a bonus in furtherance of the project.

A new timber cutting plant is to be erected by A. F. Anderson, South Boardman, Mich., in place of the mill which burned a fortnight since, but it will probably be located nearer to his present forest holdings.

Construction contracts are now being let for the new three-story plant, 145 x 180 ft., of the Fisher Body Company, Detroit.

Deep well pumps are to be provided for the new water works station at Holland, Mich., instead of having connections made with Lake Michigan and a heavy duty pumping unit installed, as originally planned.

The Kalamazoo Aeroplane Company, Kalamazoo, Mich., has established a new industry there which is expected to attain large proportions. The first machine is now being completed and orders for others have been taken.

Preparations are under way for building a plant here in which to manufacture aeroplanes and dirigible air craft. Charles J. Strobel, Toledo, Ohio, was in Detroit recently looking for a site, and it is stated that his plant there will be combined with the new factory.

Temporary measures are being taken at Richmond, Mich., to resume operations at the municipal electric plant, where the machinery was recently damaged by an accident; but the latter will probably lead to its remodeling and enlargement to meet the growing needs of the service.

The Michigan Hearse & Carriage Company, Grand Rapids, Mich., is contemplating the erection of an addition to its plant during the coming spring.

The Clarke-Carter Automobile Company, Jackson, Mich., is erecting an addition to its plant, three stories and basement, 50 x 160 ft. The basement will be used as a blacksmith shop, and testing and repair room. The first and second floors will be used for assembling and shipping rooms and the third floor for painting and trimming.

The Northern Engineering Works, Detroit, Mich., reports a large increase in sales of Northern cranes, among which are one 8-ton, 60 ft., to Gregg Company, Newburgh, N. Y.; Anderson Forge Company, two 10-ton; Pierce-Prosphate Company, one 25-ton, 70 ft.; Detroit River Tunnel Company, one 25 ton; Pennsylvania Terminal, one 25-ton; Dodge Brothers, one 10-ton and one 15-ton.

Pittsburgh

PITTSBURGH, PA., January 24, 1911.

Inquiries for machinery of all kinds are gaining in volume, but bookings continue moderate.

A new, and what is regarded by many as an important, development in the industrial growth of this district is the formation of the Pittsburgh Wood Preserving Company, Pittsburgh, which has taken measures for the erection of a timber-treating plant between this city and Connellsville on a site recently secured for the purpose. The president and general manager is Grant B. Shipley, who designed the largest tie, pile and pole preserving plants in the country, including those of the Pennsylvania and the Atchison, Topeka & Santa Fe railroads. Contracts insuring the success of the enterprise have been made with railroad companies in this district, but the plant will be operated as a general commercial proposition on orders from steam or electric railroads, telegraph and telephone companies, mining companies, municipal boards or companies controlling docks, harbor improvements, &c. With the rapidly increasing use of treated timber, to preserve it from decay, there will be room in the United States for many such plants, and their equipment of machinery is very considerable. It includes enormous steel pressure cylinders, pressure pumps, vacuum pumps, general service pumps, air compressors, boilers, feed pumps, heaters, engine or other prime mover, electric generator, motors, storage tanks, hoists, yard locomotives, special cars, equalizing reservoirs, underground discharge reservoirs, piping, steam receivers, traps, separators and a mass of auxiliary apparatus such as is commonly used with the above.

The Four States Coal & Coke Company, a new organization which has taken over several large mines in West Virginia and will market its product through the Pittsburgh-Buffalo Coal Company of this city, is reported to have decided upon plans for extensive development work which will involve the purchase, within the next few months, of considerable power and mining machinery.

It is stated at Connellsville, Pa., that additions will be made shortly to the power house and repair shops of the West Pennsylvania Railways Company, which are located there, in consequence of the company's decision to extend its lines and service.

The Beaver County Light Company, New Brighton, Pa., is reported to be considering plans for tripling the capacity of its main generating station and erecting another plant in or near Woodlawn, Pa.

Manufacturers of power machinery in this district will figure in the near future on the equipment of a large electric plant to be erected at Streator, Ill., by the Illinois Valley Gas & Light Company.

The Mataoka Electric Power Company was recently organized at Matoaka, W. Va., by James C. Stras and others, to build an electric power and pumping plant, with boiler capacity sufficient for public heating service.

The Echo Oil & Gas Company, Williamson, W. Va., has acquired the property of the Twelve Pole Coal & Iron Company and will install machinery for its development on an extensive scale.

It is reported from Erie, Pa., that the Standard Pattern Works will be opened there, about February 15, by George J. Behringer, formerly secretary-treasurer of the Modern Pattern Works. The location of the plant is 614-616 West Twelfth street.

The Martinsburg Power Company, Martinsburg, W. Va., whose plans for enlargement were recently mentioned, has ordered a duplicate of the 1000-hp. boiler at present in service, which was built by the Edge Moor Iron Company, Edge Moor, Del., and will contract shortly for a steam turbine and generator of 750 kw. capacity.

The Red Jacket Consolidated Coal & Coke Company, Thacker, W. Va., is taking measures to increase its output and will be in the market for equipment at intervals between now and spring.

Pump builders in this district expect to figure on a new unit of 6,000,000 gal. daily capacity for the city of Logansport, Ind., the purchase of which will probably be authorized about February 15 or a little later.

McCoy & Brandt, House Building, Pittsburgh, dealers in

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new and second-hand machinery, and making a specialty of crane equipment, electrical controllers and starting boxes, have purchased from the Crystal Glass Company, Wheeling, W. Va., all of the machinery in its machine shops, which includes 10, 25 and 50 hp. gas engines, six modern lathes, three shapers, one radial and one stationary drill press, tool grinders, hack saws, &c. The equipment is in good condition.

New England

BOSTON, MASS., January 24, 1911.

A stronger tone pervades the machinery market, based upon a fair amount of business actually booked, a large volume of orders known to be pending, and more cheerful reports from the machine tool builders. Not all of them are fatting up their order books more rapidly than last fall, but reports from agents and customers are more encouraging than for several months, and expectations of a revival of trade are more confident. Some works are very dull, others are fairly active, while a more fortunate class, which is increasing in numerical strength, is compelled to run overtime. The same wide variation of conditions applies to practically every line of industry. Some of the deferred local business is being placed. Additional requirements are coming to notice. The trade is watching carefully the intentions of buyers who have been asking prices, but who have not yet given promise of when the business will be placed. The General Electric Company is among the prospective customers, with a sizable number of machines for the works at Lynn, Mass. The Boston & Maine has out a list of machinery for Lyndonville, Vt., and other requirements will probably be made public by this company soon, for other old shops, which it is planned to rejuvenate. Taking the New England industrial situation as a whole, the year's expansion of works and new plants should total above the average.

Orders have been received from automobile manufacturers since the beginning of the year in amounts far exceeding the business from this source for months past. A number of builders whose machines are used in large numbers by this trade report an excess of buying which was quite unexpected. Grinding machinery seems in exceptional demand. When the slump in the automobile industry came vast totals of orders were canceled or held up. Some of this equipment has since been absorbed by the original buyers. Requests for deferred shipments have been withdrawn, and other orders have been reinstated. One large house states that at least 25 per cent. of the business canceled last summer has since been delivered, and the expectation is that a large proportion of the remainder will be placed within the next six months. The belief exists that the automobile industry is readjusting itself to the new conditions, and that the time when it will become a steady, reliable customer, like the longer established lines, is not far distant. Unfavorable reports from the New York automobile show, that orders placed for cars were less numerous than last year, are not considered convincing of a poor season, because this season no probable buyer has the fear of finding the market emptied of desirable makes of machines, while last year the rush was early and insistent. The renewed buying of machinery does not affect the standard lines of machine tools, but rather those of a semi-special nature.

The R. & T. Cement Railroad, of which Edward B. MacAllister, Rockland, Maine, is the head, will construct a line to connect the quarries of the New England Portland Cement Company, Thomaston, Maine, with the water front at Rockland. The line will be from three to five miles in length and will undoubtedly be operated electrically. New York capital has become interested in the enterprise and the general plant will be developed the coming season.

The H. B. Smith Company, Westfield, Mass., manufacturer of heating boilers and steam specialties, will erect a large building for a cleaning room, in connection with the foundry and machine shop which have already been mentioned in this column.

The factory of the Draper & Maynard Company, Plymouth, N. H., manufacturer of sporting goods, was destroyed by fire January 16, with a loss of $125,000. The company states that the power plant was saved, together with the storehouse. Temporary quarters are already secured, and manufacturing will be resumed in a few weeks. Plans are under way for a modern factory which will probably be completed before the summer is over.

The Ideal Switch Company, Plainville, Conn., manufacturer of electrical specialties, will erect a new factory. Very little machine equipment will be required in the beginning of the occupancy, but the company will need shafting and hangers, and may be in the market for a steam engine and boiler.

The contract has been awarded for the new repair shops for the Boston Fire Department, to cost about $95,000. They will be larger than the burned building, the site of which will be occupied, and will be fireproof throughout. No list of the machinery requirements will be ready for some time, it is understood.

The new roundhouse which the New York, New Haven & Hartford Railroad will construct at a cost of $200,000 will be located in North Haven, at what is known as Montowese, Conn.

The New England Brick Company, 252 Asylum street, Hartford, Conn., has begun the construction of a large plant at Farmington, Conn. It will be of steel, 40 x 200 ft., with boiler and engine house 40 x 60 ft. The boiler and engine have been purchased. The Collins-Plass Company, Fall River, Mass., will erect a cloth bag factory, 60 x 120 ft., three stories.

The Boston & Maine Railroad has just issued a list of machinery requirements for its repair shops at Lyndonville, Vt., as follows:

20 x 20 x 24 in. crank planer.
30-in. by 10-ft. planer type milling machine.
Two 24-in. by 10-ft. lathes.
One 24-in. by 6-ft. lathe.
Four 20-in. by 6-ft. lathes.
Brass turret lathe.
1½-in. double bolt cutter.
Tool grinder.
30-in. turret boring mill.
Twist drill grinder.
15-in. slotter.
60-in. plain radial drill.
Flue welder.
40-in. drill press.
72-in. plate bending rolls.
Centering machine.
Steam driven air compressor, 1000 ft. per minute.
Flue furnace.
Three oil rivet furnaces.
Two 5½-ton portable hoists.
Two 250-lb. anvils.
No. 9 pressure blower
20-in. by 7-ft. buzz planer.
Band saw filer and setter.
Iron frame rip saw table.
Cut-off saw and gainer.
24 in. x 10 ft. double surfacer.

The Boston & Maine Railroad has adopted the policy of bringing several of its old shops up to date in connection with large new works. The Concord, N. H., shops are included, as well as those at Lyndonville, but not in this list of machinery.

Indianapolis

INDIANAPOLIS, IND., January 24, 1911.

The Seaton Spring Wheel Company, Indianapolis, has been incorporated, with $10,000 capital stock, to manufacture wheels, tires and automobile parts. The directors are B. C. Seaton, W. B. Cooley and W. H. Nusbaum.

R. A. Brown has leased a building at Gaston, Ind., in which he proposes to install machinery for an electric light and power plant.

The Welchell Electric Company's plant at Anderson, Ind., has been sold at receiver's sale to the Hoyt Electric Company of Westfield, Ind. The company manufactured magnetos.

The Wabash Pearl Button Company has been organized at Delphi, Ind., with a capital stock of $20,000, to manufacture pearl buttons.

At the annual meeting of the Jenney Electric Company, Anderson, Ind., C. D. Jenney was re-elected president, V. J. Fagin was elected secretary-treasurer and P. J. Winters assistant secretary. Other directors are S. J. Murray, W. J. Murray of Cincinnati, Ohio, and L. D. Keach of Indianapolis. It was decided to leave the capital stock at $600,000.

The Bucyrus Vulcan Steam Shovel Company, Evansville, Ind., has elected the following officers: President, H. P. Eels, Cleveland, Ohio; vice-president, G. F. Steedman, St. Louis, Mo.; secretary-treasurer, C. L. Schweigart, Milwaukee, Wis.

The Muncie Regulator Company, Muncie, Ind., has been incorporated, with $25,000 capital stock, to manufacture temperature regulator devices. The directors are W. O. Haymond, J. O. Potter and W. T. Haymond.

Fire which started in the engine room destroyed the coal docks of the Big Four Railroad at Greensburg, Ind., together with the interlocking switch tower. The loss was $40,000, covered by insurance.

B. A. Myers, Goshen, Ind., is erecting a factory at Middlebury, Ind., for the manufacture of a voting machine. Later on it is the intention of Mr. Myers to establish a factory in either Michigan or Wisconsin. Additional equipment will be purchased later.

The City Council of Muncie, Ind., is considering improvements to its electric lighting system.

The Dill & McGuire Lawn Mower Company, Richmond, Ind., will erect a new factory at a cost of $100,000.

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Milwaukee

MILWAUKEE, WIS., January 23, 1911.

Manufacturers of machine tools and other equipment for shops and foundries are, in practically every instance, starting the new year with a well established trade which insures comparative steadiness of production, and the opening weeks have brought a very satisfactory run of inquiries, not only from the industrial centers of this country but also from abroad, where the business of Wisconsin firms was largely extended during the past year. Locally the demand continues slow in nearly all lines, fall and early winter buying having been sufficient for most of the present needs.

As a consequence of the demands made upon the facilities of the road by the Pacific Coast extension, which is breaking all records in the way of business handled by new trunk lines, the shops of the Chicago Milwaukee & St. Paul Railway at West Milwaukee will be crowded to their fullest possible capacity for an indefinite period; and, although the issue is evaded just now by the responsible officials, it is certain that there will be almost continuous purchasing of shop tools and supplies, motors, controllers and other apparatus, one or a few at a time, all through the year. Every order is placed through the general purchasing department at Chicago, but the recommendations of the local officials are given due consideration. The efficiency of the shops here has been radically improved by changes in equipment made within the past three or four years, and many individual economies in operation have been brought about by good management. Before the end of February contracts will be let for the construction of the new manufacturing plant to be built in Clintonville, Wis., by the Four Wheel Drive Auto Company, the plans of which are being prepared by W. W. DeLong, Appleton, Wis. The principal building of the group will be 60 x 120 ft., with a separate power house about 35 x 50 ft., with steel stack. The buildings will be of brick and steel. The manager of the company, H. B. Annable, is supervising all of the details of building and equipment.

The Hartman, Nelson & Zapfe Company, Green Bay, Wis. is proceeding with plans for new shop construction and will conclude the purchase shortly of a crane, blowers, motors, steam or power hammer and auxiliary apparatus for forging. Other details are to be taken up later.

The City Council of Menasha, Wis., has practically committed itself to the purchase of another Diesel oil engine for the municipal power and pumping plant, together with a generator, the type of which appears to have been as yet undetermined.

The C. Reiss Coal Company, Sheboygan, Wis., is about to conclude arrangements for the construction and equipment of its new dock and power house at Manitowoc, Wis., both of which will be thoroughly modern in type.

Measures are being taken by the city authorities to provide funds for the erection of an electrically operated bascule bridge in Milwaukee between Oneida and Wells streets.

Construction of a municipal power and pumping station, with water distribution and electric lighting systems, has been decided upon at New Lisbon, Wis., where funds for the purpose will be available by spring.

The wood-working plant of the Lakeside Craft Shops, Sheboygan, Wis., of which E. J. Barrett is manager, is nearing completion, and a modern line of machinery, which will be increased later as the needs of the business develop, will be installed.

Plans for a manufacturing plant at Manitowoc, Wis., are now being made by the Manitowoc Aluminum Novelty Company, but the work of building will not begin until spring has fairly opened.

Machinery, including electric motors, will be installed shortly in the addition to the plant of the Harley-Davidson Motor Company, Milwaukee, giving it considerably greater capacity than it now has.

Power and wood-working machinery will be required for the new factory of the Western Parlor Frame Company, Plymouth, Wis., which is to be completed by early spring. Good second-hand equipment may be considered.

A Corliss engine has been purchased by the Hardwood Products Company, and bids on electrical machinery for driving wood-working tools in its new plant at Neenah, Wis., are now being taken. The installation of a blower system will next be considered.

The Milwaukee Grinder & Specialties Company, Milwaukee, has been incorporated for $25,000 by Max Paul and others. It is already manufacturing small grinders.

The Milwaukee Malleable & Grey Iron Works, Layton Park, Milwaukee, is arranging for the installation of a line of induction motors for alternating current.

Measures are expected to be taken shortly at Green Bay, Wis., for the purchase of the plant of the Green Bay Water Company by the city and enlargement of its capacity.

Plans are reported to be in progress for a further extensive addition to the works of the Power & Mining Machinery Company, Cudahy, Wis., which is now operated as a branch of the International Steam Pump Company.

Preparations will be made at once to erect a new manufacturing plant for the Minn Billiard Company, Milwaukee, to replace the factory that burned last week. This was two stories, 120 x 180 ft.

Manufacturers here will figure on various details of equipment for enlarging the municipal electric plant at Norwich, Conn., including a 750-kw. steam turbine unit.

Power transmission apparatus and some new machinery will be needed for the shingle mill which the Republic Lumber Company, Marinette, Wis., will build to replace the plant that recently burned.

O. C. Uehling, of this city, is now completing plans for the new manufacturing plant of the Hummel & Downing Company, Milwaukee, the main structure of which will be 100 x 400 ft.

Preparations for an enlarged output will need to be made during the year by the Best Register Company, Milwaukee, as the result of increasing trade.

C. R. Thomson, Richland Center, Wis., who has been investigating the feasibility of a hydroelectric development on the Kickapoo River to furnish current for power and lighting service in Viola, Wis., recently arrived at a decision favorable to the project. The Viola Light & Power Company has been incorporated by C. R., A. A. and C. S. Thomson, with headquarters at Viola. Construction of the necessary dam will begin shortly.

The Logemann Brothers Company, Milwaukee, manufacturer of hydraulic and motor-driven presses, metal scrap balers, pipe-straighteners, force pumps and a varied line of special machinery, will install a line of electric motors for machine tool drive.

The La Crosse Rubber Company, La Crosse, Wis., is planning extensive improvements to its plant.

San Francisco

SAN FRANCISCO, CAL., January 18, 1911.

Business in new machine tools remains rather quiet, purchases being limited almost entirely to single tools of small size, though considerable second-hand equipment is changing hands. There are few new inquiries of an important nature, though most shops around San Francisco are starting the year with a fair amount of work on hand. The market for general machinery shows many indications of improvement, though prospective purchasers are a little slow in placing definite orders. A heavy rainfall last week has relieved all fears of a dry year, assuring plenty of water power in the mining districts. Many mines in California and Nevada are figuring on new equipment, principally in the line of electric or gasoline hoisting and pumping machinery, with some inquiry for stamp mills, power drills, &c. Pumps of various sizes for waterworks and irrigation are in good demand, and renewed activity in oil pumps and oil-well rigs is expected within the next three or four months. Some business is coming from logging and lumbering interests, and a general movement in this line is expected during the spring. Recent orders from cement and brick manufacturers have been moderate, being principally in the nature of renewals, though a few plants are being materially increased. Figures are being taken, however, on some large quarry and crushing outfits, and several transactions of this nature will probably be closed early in February.

Considerable marine work is being done in Pacific Coast shops at present. The Union Iron Works has several contracts of this class on hand, having just taken an order for a $326,000 steamer for the Interisland Navigation Company of Honolulu. It will have four Scotch boilers and a 2400-hp. triple-expansion engine. It is reported that the Southern Pacific is planning a number of steel ferry boats.

It is announced that the Craig shipbuilding plant at Long Beach, Cal., will be greatly enlarged during the year.

A number of inquiries are coming up for small locomotives, orders for which may be placed at any time within the next few weeks. A 35-ton locomotive and 12 flat cars have just been shipped to the Hilo Railroad in the Hawaiian Islands.

The California Boiler Works is now located in its new building on Howard near First street.

The Western Pipe & Steel Company has removed its offices from 9 Fremont street to 444 Market street.

The San Francisco Iron Works has been incorporated, with a capital stock of $25,000, by Fred Muck, F. and W. P. Stoesser.

The Studebaker Bros. Company of California is pre-

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paring to install a lot of woodworking machinery for the manufacture of automobile bodies at its San Francisco quarters.

R. H. Brotherton has been named as receiver for the Pacific Jupiter Steel Company.

A petition in bankruptcy has been filed against R. W. Hammer, a machinery dealer of Oakland, Cal.

H. G. Peake, formerly with the Bucyrus Company and recently with the Yuba Construction Company, Marysville, Cal., has entered into partnership with W. W. Johnson, formerly of the Northern Dredge Building & Construction Company, to engage in the designing and building of placer mining dredges. The partnership will be known as the Union Construction Company, with offices at 604 Mission street, San Francisco.

The Equitable Light & Power Company has just completed the installation of a number of large Westinghouse-Parsons turbine generators and Sterling water-tube boilers at its stations in San Francisco and Oakland. The company is preparing to install three additional boilers in its station in the Phelan Building.

It is reported that work will be started shortly on a large hydroelectric installation for the Hammon interests on the Truckee River.

The Pelton Water Wheel Company is shipping machinery for the Grangeville Electric Light & Power Company's plant at Grangeville, Idaho. It will include a 550 hp. Pelton-Francis turbine direct connected to a Westinghouse generator.

Charles C. Moore & Co., San Francisco, have taken a contract for a 300-kw. plant, including steam turbine generators and Wheeler condensers for the Vancouver Portland Cement Company, Vancouver, B. C. This company will also install a 3000-kw. power plant for the Mt. Hood Railway, Portland, Ore.

Honolulu manufacturers are shipping a complete sugar mill outfit to Mindanao island, in the Philippines.

It is reported that an automobile factory is to be added to the large implement plant of the Benicia Iron Works, Benicia, Cal.

A large electric traveling crane will be installed on the new Barnesson-Hibberd wharf at China Basin, San Francisco. The Harbor Commissioners are preparing plans for Pier 32, which will be one of the finest on the coast, with heavy traveling cranes and a complete outfit of freight-handling machinery.

The Alameda Sugar Company is installing a 150-hp. electric pumping plant, with transformer, on its land near Woodland, Cal.

The Durate Mutual Irrigation Company, Monrovia, Cal., will shortly install a high power pumping plant.

The Beeson Gold Dredging Company, Redwood City, Cal., is preparing plans for a gold dredge to operate in the Merced River bed.

The town of Mountain View, Cal., is considering the installation of a steam turbine at the municipal waterworks.

The city of Los Angeles will receive bids January 20 for a two-drum electric cableway hoist and carriage.

The Southern California Edison Company has secured permits to erect three new sections of its power plant at Long Beach, Cal.

The Southwestern Sugar Company, Los Angeles, is planning to erect a beet sugar mill near Perris, Cal.

St. Louis

ST. LOUIS, January 23, 1911.

Business is beginning to pick up; buyers are now coming out of their retirement and placing orders.

The Standard Oil Company proposes to spend an additional $2,000,000 on its large refinery at Woodriver, Ill., near St. Louis, making a total of $5,000,000 appropriated for this plant to date.

Fayette R. Plumb, Inc., has issued invitations to the inauguration of its new St. Louis plant in the St. Louis suburb of Wellston, for Saturday, January 28. This plant is for the manufacture of hatchets and other tools on a large scale, to supply Western hardware jobbers. All buildings and appliances are according to the most modern ideas.

Arthur W. Johnston and Gustav Grossmann, of Nome, Alaska, were in the city this week to purchase dredging machinery.

Albert B. Bowman, machinery dealer, reports the sale of some King boring mills and one or two other heavy tools.

The Steiner Engraving & Badge Company, whose plant for the manufacture of medals, badges, &c., is at Twentieth and Mullamphy streets, reports business very satisfactory for this season and looks for a further improvement.

The St. Louis Iron & Machine Works, whose specialty is Corliss engines and heavy machinery, is very busy and has several months' work ahead for its large plant at Main and Chouteau streets. This company has been installing some heavy tools, including a large vertical boring mill.

The St. Louis Cordage Company, maker of hemp rope, finds business very good at this time.

The Missouri Lamp & Mfg. Company, maker of wall fire extinguishers, &c., is very busy on its specialties.

The Medart Patent Pulley Company is keeping its large force of machinists and foundrymen well employed.

The Davis Expansion Boring Tool Company has been reorganized and the name will now be the Mathews-Davis Tool Company. It makes a specialty of a patented line of boring bars.

A fire at the plants of the Pennsylvania Oil Refining Company and the Tamm Brothers Glue Company, at Vandeventer avenue and Wabash Railroad tracks, caused damage to the extent of $50,000 to both companies.

Postmaster-General Hitchcock has asked for an appropriation of $100,000 for the installation of labor-saving devices in the new St. Louis post-office building. He advises the adoption of mechanical handling devices, belt conveyors, spiral chutes and bucket lifts for handling the mail.

The West End Packing Company, St. Louis, has been incorporated with a capital stock of $30,000. The incorporators are Mathew Courtney, Mathew-Courtney, Jr., and Edward Courtney.

The Model Stove & Mfg. Company, Carthage, Mo., has been incorporated. The capital stock is $15,000. The incorporators are W. L. Murphy, William Kitching and Victor Clinton.

The DeKalb County Electric Light Company, Maysville, Mo., has been incorporated with a capital stock of $15,000. The incorporators are E. A. Bunton, George F. Brown and Thomas D. Williams.

The Weg Cornice Works, Moberly, Mo., and the wholesale house of O'Keefe Brothers, were damaged by fire January 17 to the extent of $83,000.

The Pioneer Iron & Steel Company, Kansas City, Mo., has been incorporated with $10,000 capital stock. The incorporators are D. S. Rettig, L. C. Rettig and M. Andrews.

The Lawrence County Water Company, Marionville, Mo., has received a franchise to establish light and water works systems.

Toronto

TORONTO, January 21, 1911.

There is a considerable volume of important new business ready to be placed, and much more in sight, but reports indicate that competition for it is unusually keen. Some of the conditions impelling to this greater activity in pursuit of business are favorable. One is that the capacity of Canadian works engaged in the manufacture of machinery, plant equipment, &c., is much greater than it was a year ago. Another is that American interest in this market is keener. It is to be added that the selling agents of German makers of machinery are doing all they can to push trade here, and that British firms are waking up to a realization of the importance of this market and to a perception of the necessity for energetic action on their part if they are to hold their own. Talk of reciprocity between Canada and the United States has had its influence upon British competitors here. To British firms has fallen some good business for mining plant and for pulp and paper making machinery. To Canada the satisfactory feature of the situation is that the demand for machinery of all kinds continues to grow.

William Whyte, vice-president and general manager of the Canadian Pacific Railway system's lines west of Winnipeg, was in Toronto on Thursday. This year, he says, his company will at least keep pace with all other roads in the West in the matter of track laying. Double tracks are to be laid between Fort William and Port Arthur. Double tracks will be laid the whole 123 miles between Winnipeg and Brandon. Branch lines east and west of Moosejaw will be double-tracked. Altogether 400 or 500 miles of new track will be laid by the system in the West this year. Eighty-pound rails are to be used. Large terminal improvements are to be made at Regina, Moosejaw, and Medicine Hat. East of the Lakes there are to be liberal expenditures on the company's lines. Double-tracking between Toronto and Montreal is on the programme for this year. Several new steel bridges are to be built in the West, and a number of others strengthened to provide for the increasing weight of engines and loads.

The City Engineer of Toronto recommends that improvements involving an outlay of $626,544 be made in the City waterworks. Of this sum $465,000 would be laid out on a 6-ft. steel conduit.

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The works which the Canadian Automatic Transportation Company proposes to build in Welland are to be close to the Ontario Iron & Steel Company's plant and to the Page-Hersey Iron Tube & Lead Company's buildings.

The Provincial Steel Company is installing its machinery in the re-rolling mill it has just erected at Cobourg, Ont. A. L. Reading is general manager of the company.

The Central Canada Iron & Steel Corporation, with a capital stock of $500,000, has been incorporated by Dominion authority. Its head office is to be in Montreal. Some other new Dominion corporations are the Quebec Pulp & Paper Company, capital stock $15,000,000, head office Montreal: Canadian Quarries & Construction Company, capital stock $2,000,000, head office Ottawa; Brockville Construction Company, capital stock $100,000, head office Brockville, Ont.; Western Mfg. Company, lumber and contracting, capital $250,000, head office Winnipeg; Matthew Guy Carriage & Automobile Company, capital $250,000, principal place of business Oshawa, Ont.

Supplementary letters patent have been issued by the Canadian Government authorizing an increase of $3,000,000 in the capital stock of the Massey-Harris Company, manufacturer of agricultural implements, Toronto and Brantford, Ont. This brings the capital stock of the company up to $15,000,000.

A permit has been granted for additions to the foundry of the Fairbanks-Morse Company, Toronto.

It is stated that work will be begun in the spring on a plant for the electric smelting of iron at Chats Falls, 20 miles west of Ottawa, Ont.

The 10-in. mill of the Hamilton Steel & Iron Company, Hamilton, Ont., was destroyed by fire last week.

The Nova Scotia Hydraulic Company proposes to expend a large sum on the development of the water power of the Mersey River at a point near Liverpool, N. S.

The Kam Power Company, Port Arthur, Ont., is enlarging its power house and will install new machinery when the building is ready to receive it.

The Canadian Pacific Railway Company's new Port Arthur shop for repair work was opened for operations last week.

The six transformers ordered from Sheffield, England, for the municipal power plant at Winnipeg have been received, and will shortly be placed in position at Point du Bois. They are of 3000-kw. capacity which will step up to 6600 for transmission. Five alternating generators are also being shipped from Sheffield to Winnipeg for the municipal power works there. They are of 4000 hp. The machinery was all thoroughly tested at Sheffield, and proved to surpass the standard called for, and consequently was approved by the English expert engineers representing Winnipeg in the matter.

The ratepayers of Vancouver, B. C., have approved by-laws providing for the following capital outlays: $967,000 on schools; $425,000 on street improvements; $400,000 on waterworks; $286,500 on hospitals; $115,000 on exhibition buildings; and $115,000 on a steel bridge.

The National Bridge Company, a new concern of strong financial membership, is building works at Longue Point, Montreal. It is to do a general business in steel construction.

The Canadian Top Company, Tilbury, Ont., recently incorporated, is erecting a plant to be devoted to the manufacture of automobile tops. The company is in the market for bow shapers and transmission appliances.

Texas

AUSTIN, TEXAS, January 21, 1911.

Business prospects and conditions generally have been further brightened the past week by another general rain in the northern and western regions of the state. While there is still a considerable shortage of water supply in some localities, the ground is in fine condition for spring planting. Projects, involving the installation of considerable machinery, which were being held in abeyance pending an improvement in the coming season's crop prospects, are now being made ready for consummation. The wonderful agricultural and manufacturing development in the Gulf Coast region and the lower Rio Grande valley still continues without any signs of decrease. Many hundreds of new settlers are pouring into those sections from the northern and middle Western States, and the former unbroken ranch region is being rapidly transformed into a garden of industry.

Harp & Wilkins will establish a plant for the manufacture of tile for sub-irrigation at Plainview, Texas. The initial factory will have a daily capacity of 6000 ft. per day, to be increased during the year to about 40,000 ft.

The Cuero Cotton Factory will install an additional 2000 spindles, with accompanying carding, picking and weaving machinery, in its factory at Cuero, Texas. A modern humidifying apparatus and steam heating plant will also be installed. J. C. Saunders is manager.

J. M. Powell & Son, Avalon, Texas, will erect a new cotton gin at that place to cost about $15,000, to replace the plant recently destroyed by fire.

The Texas Fiber Machine Company will erect a factory at El Paso for the manufacture of machines for converting certain species of the cactus plant into fiber.

The El Paso & Electric Company will install a new gas tank of 500,000 cu. ft. storage capacity at El Paso. It will also make large extensions of its gas mains during the present year.

H. E. Powell, Springfield, Ill., and associates will install a gas plant at Plainview, Texas. He has made application to the City Council for a franchise for the proposed distributing system.

A. L. Stanford, Lyford, Texas, and associates have taken the preliminary steps toward constructing a system of irrigation in the lower Rio Grande valley which will be the means of reclaiming about 60,000 acres of land. The proposed system will cost about $1,200,000. While the primary purpose of the canal will be to irrigate 60,000 acres, it will be constructed on a scale to later on furnish water for 150,000 acres.

Receiver James F. Weed of the Beaumont Traction Company, Beaumont, Texas, will issue $125,000 in receiver's certificates for the purpose of making extensive improvements and changes in the company's electric street railway system. It is stated that the entire physical property will be overhauled.

The Gulf, Colorado & Santa Fe Railroad will install new machinery and make other improvements in its shops at Cleburne, Texas. It will also install an electric light and power plant there. W. F. Buck, superintendent of motive power, with headquarters at Galveston, has charge of the proposed work.

The Donna Sugar Mill Company is erecting a sugar mill at Donna, Texas, at a cost of about $250,000. It will be finished in time to handle the sugar cane crop of that section of the lower Rio Grande valley next season.

The City Council of Bryan, Texas, recently began the work of extending the water mains of the municipal system. More than 3000 ft. of 6-in. mains will be laid.

The Colorado River Power Company recently received 12 car loads of cotton mill machinery which it is installing in its new factory at Marble Falls, Texas.

Otto Foster will erect a broom manufacturing plant at Goliad, Texas. Many farmers of that section are planting large acreages of broom corn in order to supply the proposed factory with brush.

The War Department will install an electric lighting system at Fort Bliss, Texas. It will cost about $20,000.

The City Council of Brownsville, Texas, contemplates ordering an election to vote on the proposition of issuing $40,000 bonds for the improvement of the water works plant and electric lighting system.

Glascow, Davis & Co., New York, will erect a provision packing plant at Sweetwater, Texas, to cost $250,000.

The Northern Texas Traction Company, Fort Worth, recently increased its capital stock from $3,500,000 to $4,500,000 for the purpose of providing funds for improvements. The company is a Stone-Webster concern, which owns the interurban electric line that runs between Dallas and Fort Worth.

The McAllen Gin Company, recently organized with a capital stock of $10,000, will erect a cotton gin at McAllen, Texas. The incorporators are Scott Cawthon, W. O. Bryan and W. E. Stewart.

The Gulf, Colorado & Santa Fe Railroad, in addition to the $42,000 which was appropriated for the purchase of additional machinery for its shops at Temple, Texas, will install a steam heating plant to cost $18,000, and also contemplates installing an electric light and power plant.

The people of Deming, N. M., have voted $35,000 bonds for the construction of a complete sewer system for that town.

The plans of the American Beet Sugar Company to erect a large beet sugar factory at Portales, N. M., are making good headway. The company is also arranging to install a large electric power plant and to construct an electric railway between Portales and Taiban, N. M., traversing the center of the proposed sugar beet district. This road will do both a freight and passenger business.

The Torreon Mercantile Company, Torreon, Mexico, will install an ice plant at Velardena, state of Durango, Mexico.

The City Council of Gainesville, Texas, will purchase the water works system now operated by private company and will make extensive improvements.

The Southwestern Cement Brick & Tile Company, Victoria, Texas, has been organized with a capital stock of

THE MACHINERY MARKETS

$5000. The incorporators are James F. Welder, Theodore Buhler and John Stoffels.

The Houston Structural Steel Company, Houston, Texas, will soon make extensive improvements at its plant at Yale and Center streets. The yard will be wired for arc lights, so that a night shift can be worked. The capacity is to be increased to 100,000 tons per month. A. F. Elrod, the former manager of the company, has resigned and has accepted a position with the Union Iron Works of Houston. E. W. Jennings, formerly of Little Rock, Ark., is now in charge of the plant.

Charles J. Stanzel, of Brownwood, Texas, will establish at Aransas Pass, Texas, a foundry, machine shops and boiler works.

The creosoting plant of the International Creosoting Construction Company at Beaumont, Texas, was burned January 12. The loss is estimated at $80,000. The insurance is reported to be ample. The head office of the company is at Galveston.

The Houston Brick & Tile Company, Houston, Texas, has been organized with a capital stock of $25,000. C. A. Barbour, C. R. Miner and Captain Tellaferro are the incorporators.

The Wichita Falls Motor Car Company, Wichita Falls, Texas, has been incorporated, with $160,000 capital stock, and will erect a plant of about 50,000 sq. ft. of floor space, which will be equipped to manufacture motors, transmissions, axles, bodies and a single lever control for shifting gears, handling clutch, throttle and spark patented by C. A. McKiearnan. Charles Adams, who was factory manager of the E-M-F Company, Detroit, Mich., will be manager of the new company. The incorporators are J. A. Kemp, F. N. Kell, J. G. Culbertson, C. A. McKiearnan and R. G. Schefferly, formerly designer and assistant engineer of the E-M-F Company.

The South

NASHVILLE, TENN., January 23, 1911.

The attention of the trade is largely directed at present to equipment needs necessitated by the building of new industrial roads or extensions, as well as other steam and electric lines, by terminal, river and harbor improvements, by hydroelectric power plants, and by development work in connection with ore and coal mining, quarrying and the recovery of phosphate rock and minerals. Second-hand outfits in good condition are quite freely offered and taken, particularly heavy machinery that has been rebuilt.

The Roanoke Gas & Water Company, Roanoke, Va., has decided upon the enlargement of its gas generating and holding plant, which, with the distribution system, will hereafter be conducted by a separate corporation from that in charge of the water works.

Unconfirmed advices from King, N. C., are to the effect that a machine shop will be established there by the V. T. Grabs Company, recently incorporated by Geo. E. Babcock and others.

A large increase in its manufacturing facilities, including an addition to the factory, is being provided for by John B. Ransom & Co., Nashville, Tenn. Boxes are the principal product.

The Gregory-Conder Motor Company is reported to have been organized at Columbia, S. C., to establish an automobile selling agency and repair plant. A. J. Gregory, W. T. Gregory and J. W. Conder are named as incorporators.

E. M. Wallace, manager of the Capitol Lumber Company at Frankfort, Ky., has been granted a franchise by the city to build an electric power plant for public service and will proceed with the work at once. Transmission lines will be run to nearby communities and transformer substations provided.

Plans for extensive additions to its plant, including the installation in due course of some new machinery, are being considered by the Bristol Door & Lumber Company, Bristol, Tenn.

An electric plant is to be constructed at Warrenton, N. C., to furnish industrial power and lighting service, by the Warrenton Electric Light Company, recently organized by J. W. White and others.

The Richmond Electric & Power Company, Richmond, Ky., has provided funds for the further development of its system, which includes a modern generating plant, engine driven, with a capacity of 150-200 kw.

The mill of the Bryant Lumber Company, Wilson, N. C., which recently burned, will probably be rebuilt this spring.

A large new manufacturing plant equipped with electric motor drive will be established in Thomasville, N. C., by the Cramer Furniture Company.

A. P. White & Co., Cadiz, Ky., are planning to build a concrete dam in the spring and construct a hydroelectric power plant, with mill, elevator, &c.

The Rome Soil Pipe Mfg. Company, Rome, Ga., will make some improvements in its plant, including the installation of a blower unit.

A bond issue to cover the cost of constructing an electric power plant is proposed at Fairburn, Ga.

Additional pumping machinery is needed at Laurel, Miss., and will probably be provided for this year.

It is stated that a new boiler and other equipment will need to be provided by the Standard Lumber & Box Company, Nashville, as the result of an explosion which occurred lately damaging its plant.

The city of Patterson, La., has engaged Fred A. Jones, Houston, Texas, as engineer in charge of construction of water works for which the sum of $30,000 was recently voted. A 1000-gal. pump will be installed.

The Sanford-Day Iron Works, Knoxville, Tenn., is preparing to erect a new foundry at an estimated cost of $200,000.

The plant of the Marias Central Sugar Refinery at Lorienville, La., was burned January 13. The loss is estimated at $200,000. The plant was insured for $120,000.

The Railway Brake Shoe Company, Moundsville, W. Va., has completed plans for the erection of a plant which will comprise a two-story mixing and press room, 50 x 120 ft.; annealing room, two stories, 60 x 100 ft., and foundry, one story, 80 x 100 ft. The total floor space of the buildings will be 25,000 sq. ft. J. L. Cohagan is president of the company.

The Aluminum Company of America, Pittsburgh, Pa., states that the article in the Knoxville (Tenn.) papers to the effect that it has under way a $5,000,000 power development project on the Little Tennessee River is entirely erroneous. The company is simply investigating some small water power rights and may undertake to develop them in a year or two if the surveys are favorable.

The Southwest

KANSAS CITY, MO., January 23, 1911.

From all parts of the Southwest, and particularly the more recently developed sections, come reports of renewed activity. Orders for the smaller plants predominate, but quite a number of large projects are also under way.

Rollins & Westover, Kansas City, will furnish the city of Pattsburg, Mo., shortly with preliminary plans and estimates for the construction of an electric plant for illuminating and commercial service.

C. H. Cole, president of the United Iron Works, Springfield, Mo., is reported to be interested in a plan for the construction of a hydroelectric power plant of large capacity on the White River, not far from that city.

The project for municipal water works and sewage improvements, together with an electric power and lighting plant, which has been pending at Glasgow, Mo., for some time past, is being brought to a head, as the result of a favorable court decision on a bond issue the legality of which was disputed. An engineering firm in Kansas City was recently engaged to prepare plans and specifications, so that bids covering equipment will probably be invited within a month or two.

The capacity of the municipal lighting plant at Oregon, Mo., which is at present equipped with an engine-driven generating set of 60 kw., will be enlarged by the installation of a 100-kw. unit, with additional boiler of 150 hp. and auxiliary equipment, none of which has been purchased.

W. C. Pearce, Marked Tree, Ark., will install modern shingle making machinery in an idle saw mill there and operate it.

It is reported from Sylvia, Kan., that an electric power plant will be built there to replace the one which burned.

The plant of the Jones Mfg. Company, McAlester, Okla., containing power and planing mill machinery, was recently burned and will be rebuilt.

The Bisbee-Naco Water Company, Bisbee, Ariz., expects to construct a steel water tank of 500,000 gal. capacity.

Plans for municipal power plant at Durant, Okla., were recently approved by the City Council and the project will be pushed to completion.

The lighting plant at Conway, Ark., which was taken over by the city from the Conway Electric & Mfg. Company, has been damaged by an explosion and some new equipment is likely to be needed.

It is probable that the enlargement of its shops at Coffeyville, Kan., together with other improvements, will be entered upon shortly by the Missouri Pacific Railroad.

The purchase of machinery for municipal water works will be taken up in the near future at White City, Kan.

THE MACHINERY MARKETS

In addition to the power plant extensions recently noted, the Oklahoma Railway Company, Oklahoma City, Okla., has decided upon building a modern forge, machine and wood-working shop for repair work, at a site secured on Second street, to replace the small plant now operated at Twelfth and Santa Fe streets, which is no longer adequate to the demands of the service.

A municipal water works system is to be constructed at Englewood, Kan. The purchase of machinery and other equipment will be determined upon between now and spring.

Work is about to be commenced on the construction of the Uncompahgre & Gunnison Valley Railway, 29 miles, the headquarters of which are in Montrose, Colo. M. L. Paret, Kansas City, is reported to be the engineer in charge. The details of power equipment have not yet been considered.

The J. S. Worley Company, Reliance Building, Kansas City, has been engaged by the municipal authorities at Mound City, Kan., to prepare plans and specifications for a pumping plant and water distribution system.

The Pike County Water Company, Murfreesboro, Ark., has engaged an engineer to prepare plans for its proposed hydroelectric plant, which will be of about 10,000 kw. capacity.

Improvements, including the purchase of some new equipment, are to be made in the system of the Webb City & Carterville Waterworks Company, Webb City, Mo.

The Lumberman's Cement & Brick Company, R. A. Long Building, Kansas City, Mo., has been incorporated with $1,250,000 capital stock to manufacture and deal in Portland cement, lime, plaster, terra cotta, &c.

Burns & McDonnell, Kansas City, Mo., are preparing plans for an electric light and water plant for the city of Upton, Wyo.

The H. J. Brunner Metal & Machinists Supply Company, Kansas City, Mo., whose stock was recently destroyed by fire, advises that it would be pleased to receive manufacturers' catalogues and price lists. The company expects to be in business again within the next 10 days.

Edward Snyder, Kansas City, will erect at Broken Bow, Neb., a packing plant at a cost of $100,000.

Spring Hill, Kan., has voted bonds in the sum of $6000 for the construction of an electric light plant.

The Pearce Lumber Company, Pine Bluff, Ark., has been organized with a capital stock of $60,000. T. Pearce is president, J. F. Rutherford vice-president and James H. Allen, late of Memphis, Tenn., secretary and treasurer. The company has leased the plant of the Bluff City Lumber Company at Kearney.

The Hot Springs Gas Company, Hot Springs, Ark., has been incorporated. The capital stock is $100,000. The incorporators are W. C. Fordyce, W. A. Butrell and Henry J. Lehman.

The furniture factory operated by the Gurath-Lombard Company, Independence, Kan., was destroyed by fire January 10.

Loag & Bell of Lyons, Kan., have purchased the old Plumb elevator as a site for their ice plant and will erect a new building, 40 x 75 ft., and have it ready by the time the machinery arrives.

Judge L. F. Parker, Vinito, Okla., is preparing the plans for the formation of a company to erect a cotton gin plant to be run by electric power.

The plant of the Rogers Ice & Cold Storage Company, Rogers, Ark., is now being erected. It is to cost $20,000 and will have an ice storage capacity of 1500 tons.

Farther Central West

OMAHA, NEB., January 23, 1911.

Manufacturers of agricultural machinery and vehicles, mill and elevator outfits, steam and gasoline engines, &c., are crowding their output at present and effecting gradual improvements in shop or warehouse facilities which will enable both production and distribution to be accelerated. From these sources dealers are receiving numerous inquiries, some of which concern new plants or shop buildings to be erected before next fall, and there are indications that many deliveries of tools will be contracted for a long time ahead. In the general industrial field prospects are also excellent, but with the demand now extremely variable. The Western mining districts show up strong. Reports from Denver, Salt Lake City and other cities of Colorado, Wyoming and Utah have recently been almost uniformly favorable.

The boiler capacity of the Centerville Light, Power & Traction Company, Centerville, Iowa, whose present battery consists of Atlas and Murray units aggregating 300 hp., is to be doubled, if the present plans for an extension of its central heating system are consummated. Other improvements, including the addition of new electrical apparatus, may also be entered upon.

The franchise for an electric power and lighting plant at Carbondale, Colo., has been granted to W. M. Dinkel.

A vote is to be taken in the spring at Gunnison, Colo., on the question of building an electric plant for municipal service, to replace the present small station, 125-kw. capacity, which was taken over from the Gunnison Gas & Water Company and is now inadequate to the requirements of the community. Hydroelectric power is proposed, with the existing station as a reserve.

The Telluride Power Company, Provo, Utah, which has constructed a number of large hydroelectric plants under the direction of L. L. Nunn, is preparing to build another on the Malad River, near its junction with the Snake, where there is a fall from which upward of 10,000 hp. can be developed.

An air compressor operated by electric power will be purchased by the Sugar Loaf Consolidated Mining Company at Sugar Loaf, near Leadville, Colo., together with additional drilling machinery.

The construction of a water works plant is under consideration by the municipal authorities at Mayfield, Utah. No definite plans in relation to equipment have as yet been arrived at.

The Qualm Vacuum Cleaner Company, Waterloo, Iowa, has closed a deal at Charles City, Iowa, by which it comes into possession of a large tract of land and will move its factory in the near future.

The Des Moines Sawmill Company will erect a new gunstock mill in Des Moines, Iowa.

The Rockwell City Bottling Works, Rockwell City, Iowa, has been sold to a Carroll, Iowa, firm. The new proprietors have made a deal for a garage building which they will use in connection with the bottling establishment. It is their intention to fit up the plant with new machinery, using electricity as motive power.

The roundhouse of the Iowa Central Railroad at Marshalltown, Iowa, was burned January 16.

The grain elevator of Payne & Sargisson at Luton, Iowa, was burned January 14. The loss is estimated at $13,000.

Government Purchases

WASHINGTON, D. C., January 23, 1911.

The Panama Railroad Company's circular No. P-3003 calls for bids to be opened February 1 for furnishing eight 4-ton electric cargo handling cranes.

The Department of the Interior of the United States Reclamation Service, Washington, will open bids February 15 for furnishing centrifugal pumps, motors, transformers and switchboards for Salt River project, Ariz.

H. C. Newcomer, Lieutenant-Colonel of Engineers, United States Army, Pittsburgh, Pa., opened bids January 11 for a water power air compressor plant at lock No. 1, Monongahela River, as follows: Trump Mfg. Company, Springfield, Ohio, $3750; American Compressor & Pump Company, Baltimore, Md., $3569; Blaisdell Machinery Company, Bradford, Pa., $3710; Hall Steam Pump Company, Pittsburgh, Pa., $3159, $3268, $3343, $3532.75 and $3650.

The Constructing Quartermaster, Fort Howard, Md., opened bids January 10 for constructing pump house and installing machinery at Fort Smallwood, Md. Various alternate bids were received. Bids for the completed work are as follows: Peters & Harding Constructing & Building Company, Baltimore, Md., $4000; H. C. Clark, Delaware City, Del., $2460; L. B. Jacobs, Newark, Del., $1973; McKay Engineering Company, Baltimore, Md., $2039.50; James L. Robinson, Baltimore, Md., $2881; M. W. Hill Company, Baltimore, Md., $3933; F. J. Boas, Philadelphia, Pa., $2780.50.

The Bureau of Supplies and Accounts, Navy Department, Washington, opened bids January 17, as follows:

Class 1.—One hand painter and jointer—Bidder 33, J. A. Fay & Egan Company, Cincinnati, Ohio, $408.10 and $358.60; 36, Fox Machine Company, Grand Rapids, Mich., $218; 49, Hallidie Machinery Company, Seattle, Wash., $255; 63, J. P. Kemp, Baltimore, Md., $274; 81, Oliver Machinery Company, Seattle, Wash., $565; 83, Perrine Machinery Company, Seattle, Wash., $296; 93, H. B. Smith Machine Company, Smithville, N. J., $323; 118, Arthur P. Homer, Boston, Mass., $180.

Class 2.—One special motor headstock lathe—Bidder 3, American Woodworking Machinery Company, Rochester, N. Y., $284.50 and $332.50; 33, J. A. Fay & Egan Company, Cincinnati, Ohio, $207; 49, Hallidie Machinery Company, Seattle, Wash., $343.75 and $316.25; 63, J. P. Kemp, Baltimore, Md., $227.50.

Class 41.—One high pressure air compressor—Bidder 53, Ingersoll-Rand Company, New York, $7690, $7735, $7455; 77, Norwalk Iron Works Company, South Norwalk, Conn., $4600.

Bids were opened December 21 by the inspector of the Second Lighthouse District, Boston, Mass., for furnishing one oil engine and air compressor for light vessel No. 41, as follows:

Ingersoll-Sargent Drill Company, Boston, Mass., $4398 and $4591; American Air Compressor Works, New York, $4547 and $4859; De La Vergne Machine Company, New York, $4960, $4900, $5195 and $5135; August Mietz Iron Foundry & Machine Works, Boston, Mass., $4936, $4540, $5900, $5285, $4842 and $6285.

American Electrochemical Society

Chicago Members Discuss the Electric Furnace

A Chicago section of the American Electrochemical Society was organized recently, with Prof. H. N. McCoy of the University of Chicago as chairman, and Arba B. Marvin, 115 Adams street, Chicago, as secretary. The first general meeting of the section was held at Chicago Friday evening, January 20, at the rooms of the Western Society of Engineers. The papers related to the electric furnaces in the manufacture and refining of steel, and the meeting was very successful. About 200 were in attendance, including engineers, chemists and metallurgists of the leading iron and steel and foundry interests of Chicago and vicinity. The following formal papers were presented and discussed:

"Electric Furnaces for the Manufacture of Iron and Steel," by James Lyman, district engineer for the General Electric Company, Chicago.

"Reliability of Electric Furnaces for Commercial Work," by F. T. Snyder of the Metallurgic Engineering Company, Chicago.

"Electrolytic Refining as a Step in the Production of Steel," by C. F. Burgess, professor of chemical engineering at the University of Wisconsin, Madison, Wis.

"The Electric Steel Furnace of the Illinois Steel Company at South Chicago," by Chas. G. Osborne, superintendent of special steels of that company.

The meeting was preceded by a dinner and a business meeting of the Chicago section of the American Chemical Society, at the Grand Pacific Hotel, at which the Chicago members of the Electrochemical Society were guests of the older organization.

Mr. Lyman was introduced as the first speaker at the evening meeting. He reviewed the progress of the electric furnace in the manufacture of steel, both in Europe and America, showing stereopticon views of leading types and installations. He explained in detail the equipment and operation of all the successful types and gave data showing the amount of electrical current used in reducing iron ore, in melting and refining cold pig or scrap, and in refining hot metal. His paper, with illustrations, will be presented in a later issue of *The Iron Age*. The papers of Mr. Osborne, Mr. Snyder and Professor Burgess are given on other pages.

Discussion

Answering the question whether there are electric furnaces designed for brass melting, Mr. Snyder said: "They have been used for the melting of copper quite extensively in commercial work and the melting of brass has been carried on in a way, but I don't know of any furnace that is running regularly melting brass commercially."

Question: In melting copper is there much oxidation?

Mr. Snyder: Not in copper. They use the oxidizer just as they do in steel. Consequently they get a copper which is very much freer from oxidation than the ordinary copper refining furnace manufactures.

Professor Burgess was asked whether he ever used molten iron for electrolytical work. He said: "Only to a very slight extent. We got no encouraging results."

Mr. Jones: One point I consider very important is the cost of the current. Using it during the off months or at the off times of the day, the rate of the ordinary charge for the refinery will be almost one-half of the ordinary price, and that will make it very low indeed and ought to help out a great deal in this business.

Mr. Brady, chemist at the Illinois Steel Company's works, was called out. He said: "As Mr. Osborne stated in his paper we are apt to get anything in our analysis of slag. I must say we have had our troubles trying to analyze it, and in trying to say which belongs here and which belongs there we have got a pretty difficult problem, and I think possibly we have solved it as well as we can; maybe not quite as satisfactory as it might be. We are still working on it."

Mr. Baker: I would like to ask Professor Burgess if he ever tried electrolyzing iron from chloride solutions?

Professor Burgess: You cannot get deposits of iron from chloride solutions as satisfactorily as from sulphate solutions. However, it is simply a question of adjusting your electrolyte so you can build up a big deposit and which will be cheaper. Other experimenters have reported satisfactory results from chloride solutions, but we have not been so successful.

Mr. Bentley: May I ask Professor Burgess if he has the electrodes in motion in depositing the iron; whether they are moving while the iron is being deposited or whether they are stationary in solution.

Professor Burgess: Everything is perfectly quiet in the tank. We have tried the effect of rapid circulation and slow, and find little, if any, change in it; in fact, the tanks are left for several months without cleaning out—that is, cleaning out at the bottom. But once a week the solution is circulated through a series of tanks, just circulating two or three times.

Mr. Bentley: I believe in certain plating work, by rotating the electrodes quite rapidly, a deposit which is more uniform and which is smoother and freer from crystalline structure is obtained, and I was wondering whether it might not have the same effect with the iron.

Professor Burgess: Of course, what we tried to do was to work out a process for doing this as economically as possible. If you figure the cathode investment in moving the electrode throughout your entire plant, it would be a very expensive proposition. We have tried to deposit iron tubes by rotating the cathode, but never got any higher deposits from it than by having them quiet.

The Canadian Duty on Rerolled Rails

The Provincial Steel Company is now installing its equipment for rerolling steel rails at Cobourg, Ontario, Canada. It is apparently for the benefit of this company that the Canadian Government has issued an order terminating the rate of duty heretofore existing of 25 per cent. of the cost of rerolling rails "which have been in use in the tracks of railroads in Canada, and which have been exported from Canada and returned thereto after having been rerolled and weighing not less than 56 lb. per lineal yard when rerolled, and which are to be used by the railroad company importing them on its own tracks." This order was issued under a provision in the Canadian tariff that "whenever the Governor-in-Council is satisfied that a mill adapted and equipped for rerolling such rails in substantial quantities has been established in Canada" the duty thus specified could be abolished, and that "thereupon all such rails when imported shall be subject to such duty as otherwise provided" in the Canadian tariff. A duty of $7 per ton is now imposed on such rerolled rails.

It is alleged that the arrangement was sometimes taken advantage of to send new rails in to Canada under the misrepresentation that they were old Canadian rails rerolled, but this does not seem to have been a consideration in deciding the Canadian Government to put an end to it. The change will be welcomed by the Canadian steel interests, but it will not be relished by the railroad people. Of course, the effect will be to put a complete stop to the sending of Canadian old rails to American mills to be rerolled and returned, for the duty of $7 a ton now required would prohibit reimportation.

A new journal in the technical field is *Mill Supplies*, the initial issue of which has just appeared. It is published by the Crawford Publishing Company, 209-213 North Jefferson street, Chicago, and will be issued monthly at a subscription price of $2 per year. It is specially devoted to the interests of jobbers and manufacturers of mill, steam, mine and machinery supplies. Elmer Crawford is editor-in-chief; Clay C. Cooper, managing editor, and the associate editors comprise a corps of six. Elmer Crawford is president; S. P. Browning, Maysville, Ky., secretary Ohio Valley Pulley Works, and president American Supply & Machinery Manufacturers' Association, is vice-president; C. W. Miller is secretary; John K. Allen is treasurer. An advisory board comprises men of prominence in the manufacture or jobbing of machinery and mill supplies.

The 15-Ton Heroult Furnace at South Chicago*

Details of the Manufacture of Electric Steel—A Typical Charge Sheet and a Chart Showing Fluctuations in Impurities

BY CHARLES G. OSBORNE.†

The 15-ton Heroult arc furnace at South Chicago has now been in more or less continuous operation since May 7, 1908, a period of over a year and a half, and therefore a few experiences of those who have been connected with these operations will, perhaps, be of interest.

Description of Furnace

Upon a solid foundation about 5 ft. above the ground level a stationary rack 8 ft. 9 in. long is fastened. Upon this rack the furnace proper rests on a floating pinion fastened to its shell by rivets. The arc of this floating pinion has a radius of 10 ft. and aims to give the furnace an angle of approximately 20 degrees when tilted over to its full extent. The position of the furnace when tilted is shown in Fig. 1. Attached to the extreme back of the furnace is an 18-in. plunger with a 4-ft. stroke working in a cylinder attached to a hydraulic line of 500 lb. pressure to the square inch. This gives a lifting power of approximately 45 tons. The balance of the furnace is so arranged that the equilibrium is never upset, and therefore to return to a horizontal position merely requires the releasing of the pressure and the furnace returns of its own weight. It will be readily seen that the floating pinion and rack work requires some provision for the forward motion of the furnace when tipping. This is taken care of by having a movable cylinder pivoted at both the top and bottom, which allows the cylinder to follow the motion of the furnace.

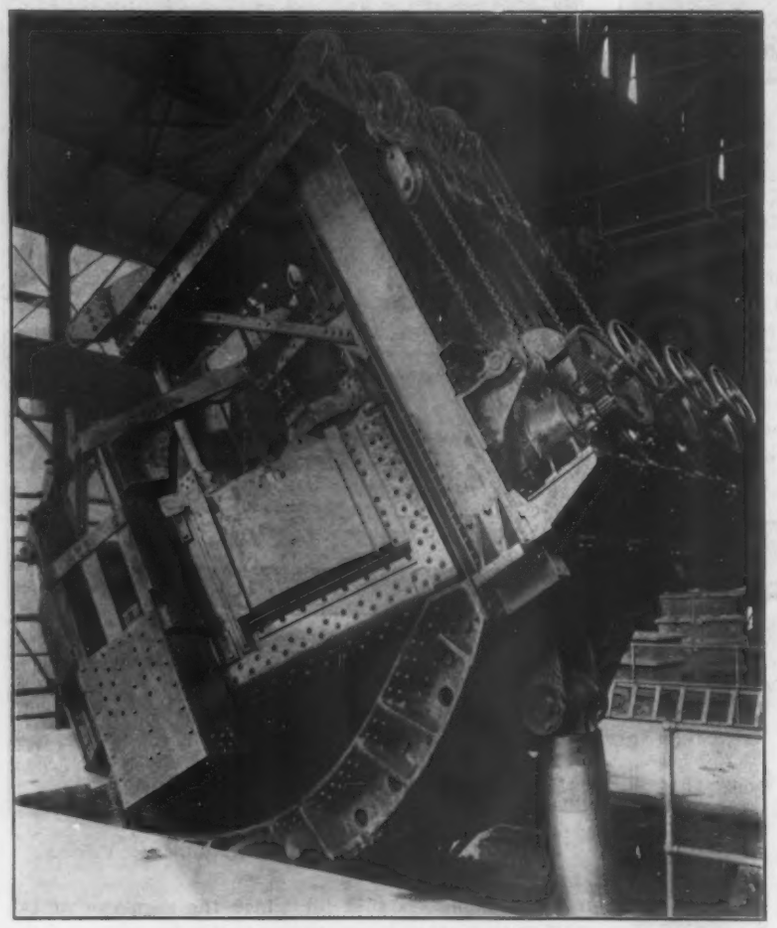


Fig. 1.—15-Ton Heroult Electric Furnace at South Chicago Works of Illinois Steel Company.—Furnace Tilted by 18-In. Plunger.

Construction of the Furnace

The furnace shell is of plate steel, 1 in. in thickness, riveted together. The outside horizontal cross section plan is approximately that of a complete circle of 13½ ft. in diameter, with two flattened portions situated at the front and back respectively. The outside vertical cross section can be readily seen by referring to Fig. 2. On the bottom of the furnace, within the 1-in. plate, and next to it, one row of magnesite brick laid the 4½-in. way is placed across the flat portion. The side walls of the furnace are vertical and consist of two rows of magnesite brick laid the 9-in. way, giving a thickness of 18 in. of magnesite brick. These solid magnesite brick walls extend up to the furnace roof. The bottom proper of the furnace consists of dead burned Spaeter magnesite to a depth of 12 in. at its thinnest point, which is, of course, at the extreme center. From this thinnest point the bottom slopes gradually upward so as to form a portion of a sphere 7 ft. 2 in. in radius.

To diverge a moment from the construction of the furnace, this bottom was put in in the following manner: Dead burned and carefully ground Spaeter magnesite was mixed with basic open hearth slag in the proportion of four of magnesite to one of open hearth slag. To this mixture sufficient tar was added to make the mass sufficiently plastic to enable it to be tamped into the furnace in the usual manner. The entire depth of the bottom was tamped in this way. Next the furnace was filled with wood dried out for about 48 hours and then filled with coke and the electrodes lowered and the current turned on. In this way the bottom was fluxed into place.

The roof of the furnace is of silica brick 12 in. in thickness. The roof is made up on a movable ring. This rig is fitted with a top and bottom angle iron to take a skewback brick, and then from this the arch is spanned across the 10-ft. interior of the furnace with an 8-in. rise. The bricks are set in circles parallel to the steel ring, the usual wooden wedges being placed here and there to take care of the subsequent expansion of the brick. Holes for the electrodes are left in the roof by means of templates placed in position. The bricks are held in position around these holes by their lateral pressure.

There are five doors, two on each side of the furnace, and one in front over the pouring spout. These doors are of cast iron lined with clay brick laid the 4½-in. way. They work in the usual groove arrangement and are operated by steam pressure of about 150 lb. The front door over the pouring spout is an exception to this, being operated by hand with a counterbalance.

The Electrodes and Their Handling Device

The three electrodes are let down through the roof in the form of an equilateral triangle, each side of which is 5 ft. 2 in. in length. The apex of this triangle points

* From a paper read before the Chicago Section of the American Electrochemical Society, January 20, 1911.

† Superintendent of special steels, Illinois Steel Company.

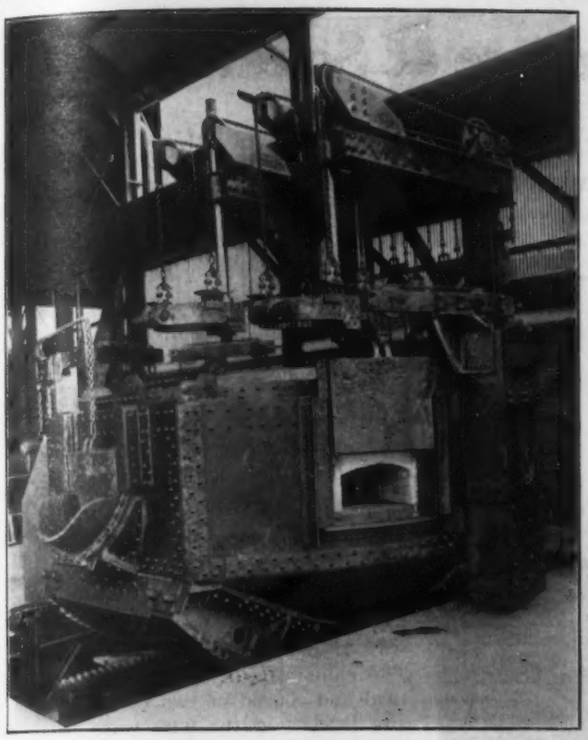


Fig. 2.—Side View Showing One of Five Doors, Also Method of Supporting Electrodes.

directly east—that is, toward the back of the furnace. The center of this triangle coincides with the center of the furnace roof. The overhead structure which supports these electrodes may be seen in Fig. 2. There are, of course, three separate holders, one for each electrode. Each holder is constructed of a solid copper casting bolted directly to the bus bar. In front these holders are split and joined with a right and left screw, which enables the holder to be opened or closed at will. The holders are designed to carry a 24-in. electrode, but by means of contact blocks to fill, any smaller sized electrode can be employed. The weight of the electrode is supported by the chains. These run back over pulleys to the drums at the back of the furnace. The electrodes are kept in alignment by vertical guides. They are regulated by individual motors placed at the back of the furnace. These motors are attached by gears to the drums. The regulation is by hand, by controllers or by an automatic device.

Each electrode is, of course, regulated separately, and (referring to Fig. 3) its regulation is as follows: A stationary magnet coil, the current through which can be adjusted at will, is opposed by a floating magnet coil, whose position is determined by a spring and the amount of current passing through it. The current in this floating magnet is obtained from a current transformer attached to the bus bars. When the current in the bus bars and the proportional current, therefore, of the floating magnet, is that for which the regulator of the stationary magnet is set, the magnetic opposition of the two magnet coils is exactly counterbalanced by the strength of the spring, and the apparatus is at rest. When, on the other hand, the strength of the current in the bus bars, and consequently the proportional current in the floating magnet, is either greater or less than that at which the stationary magnet is set, then the magnetic opposition of the two magnet coils either overcomes or is overcome by the strength of the spring, and the two magnet coils either retreat from or approach toward one another. This motion of the floating coil is transmitted by a lever which in turn causes a dog to drop into a slot in a constantly moving rocker wheel, and in this way a right or left contact is made, and the direct current motors controlling the electrodes are started, either clockwise or anticlockwise, and the electrodes in turn are either raised or lowered. This is repeated with each oscillation of the locker until equilibrium is restored. It might be of interest to state here that each contact made as spoken of above serves to raise or lower an electrode about ⅛ in. It has already been stated that the regulation can be by hand controllers. These three hand regulators are situated at the back of the furnace

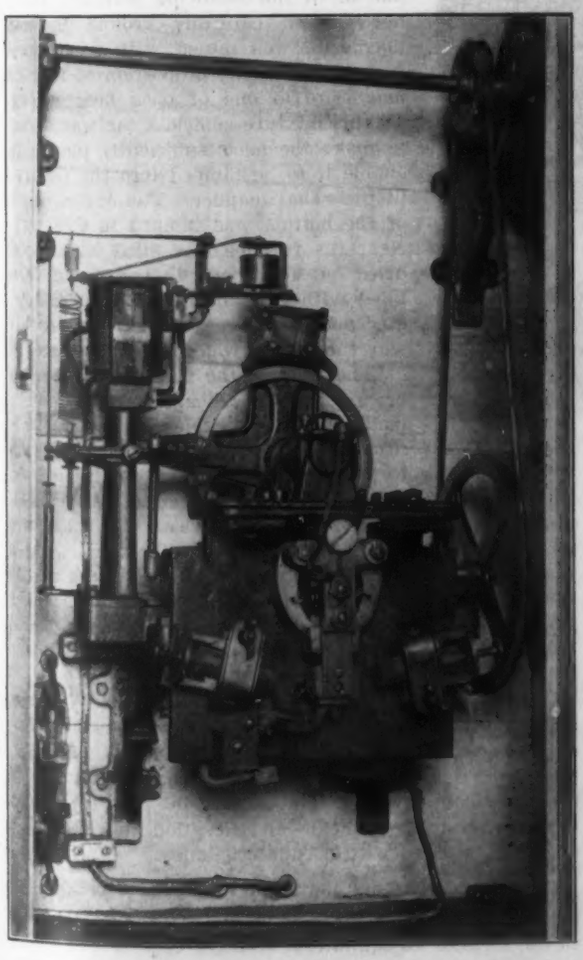


Fig. 3.—Mechanism for Automatic Regulation of Electrodes.

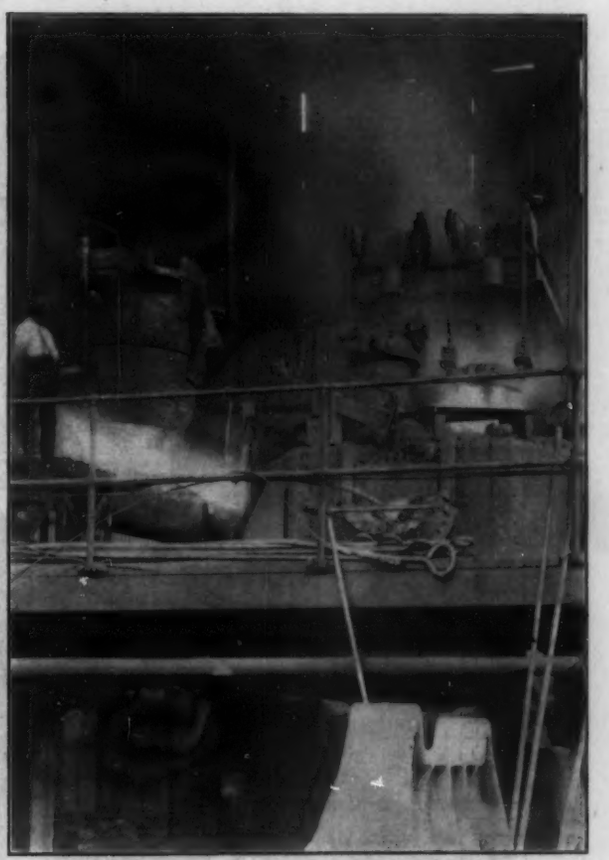


Fig. 4.—Charging Converter Metal Into Electric Furnace.

at a distance of about 4 ft. It is, of course, understood that the use of the hand regulators simultaneously disconnects the automatic regulators.

Power Supply

The power for the furnace is generated by dynamos having as prime movers reciprocating gas engines, recip-

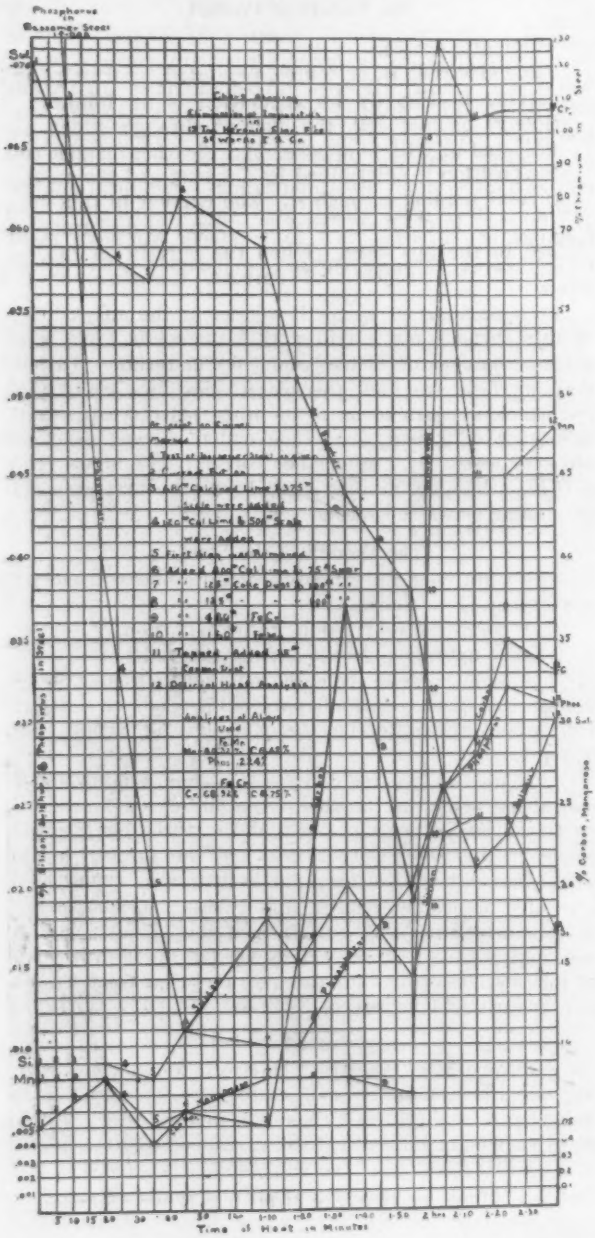


Fig. 5.—Diagram Showing Elimination of Impurities in the Process of Making an Alloy Heat.

rocating steam engines, high pressure and low pressure turbines. It is three-phase in character, 2200 volts and 25-cycle.

At the electric furnace it is stepped down by means of three 750-kw. transformers to the voltage of the furnace. These transformers are so arranged with switches that the primary turns may be altered to give a secondary voltage of 80, 90, 100 or 110 volts as desired. Ordinarily 90 volts is used.

The operating platform of the furnace is about 9 ft. from the ground level. Around the furnace on this platform, at convenient points, bins are placed for the miscellaneous materials used in furnace operation. The front part of the furnace platform opens up to allow a ladle to be hung in position when the furnace is tapped and for any miscellaneous work in the pit. The pouring platform is situated to the south of the furnace. It is 30 ft. long, and enables eight molds to be placed in position for pouring. The entire building is spanned by a 50-ton crane.

The Operation of the Furnace

The normal operation of the furnace is as follows: Ordinary Bessemer pig iron is full blown in a 15-ton Bessemer converter in from 8 to 12 minutes. It is then poured directly from the Bessemer vessel to an electric furnace transfer ladle, and drawn by locomotive to the electric furnace building, a distance of about ¼ mile in about five minutes. As a precaution against the possible formation of a skull in the ladle, the Bessemer charge is blown about 1500 lb. of scrap hotter than ordinary Bessemer practice. Immediately the ladle is received at the electric furnace, Fig. 4, it is picked up by the crane, slightly tilted, and the silicious slag is completely cleaned

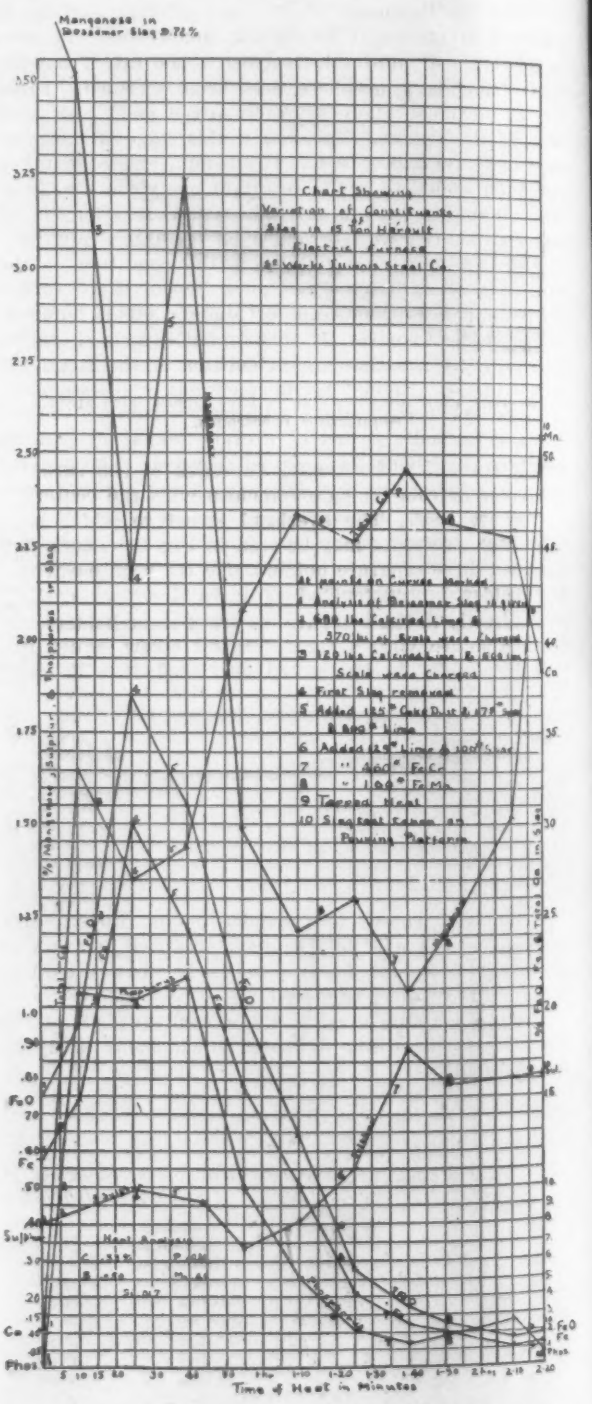


Fig. 6.—Diagram Showing Fluctuations in Slag Analysis at Various Stages of a Heat.

off by hand rabbling. The metal is now ready for charging. To do this the ladle is merely turned over on its trunnions, and the metal poured into a spout through which it rushes to the furnace. This operation of cleaning off the slag and charging occupies from 5 to 10 minutes. The electrodes are lowered and the current turned on.

As the metal is being poured into the furnace the

helpers shovel iron oxide and lime into the furnace through the working doors. In this way a basic oxidizing slag is produced, which serves to remove the phosphorus. In about 30 minutes this slag has served its purpose and the furnace is tilted slightly forward and the slag removed in from 5 to 10 minutes by hand rabbling.

The recarburizer is added at this point. On the bare surface of the oxidized metal lime is quickly added with sufficient fluorspar to keep the mass fluid. In about 15 minutes this lime is melted, and finally divided coke dust is now thrown on the top of the slag beneath each of the three electrodes.

Under the influence of the arc calcium carbide is produced in gradually increasing quantities. As soon as this state of affairs is reached a neutral, if not actually reducing atmosphere, has been obtained. From here to the finish there is practically a dead melt in a reducing atmosphere. The slag at this stage of the process is fluid and highly basic. If a sample should be taken and water added to it the resultant acetylene gas, from the well-known calcium carbide water reaction, is of sufficient quantity to light and burn for half a minute.

Tests are now taken to show the condition of the steel. A small cylindrical test piece is poured and forged to a round pancake shaped object under a steam hammer, located at the furnace. If this forged sample shows by its appearance a satisfactory condition of the metal the bath is tapped. If not, further refining is necessary.

To tap the furnace the electrodes are raised from the bath and the ladle swung by a crane under the pouring spout and the lilting lever pulled forward. The pouring is done through a 1½-in. nozzle to molds of varying sizes.

Table 1.—Electric Furnace Charge Sheet.

Material:	Pounds.
Bessemer blown metal	30,000
Scale	700
Ferromanganese, 80 per cent.	200
Ferrosilicon, 10 per cent.	60
Ferrosilicon, 50 per cent.	80
Recarbonizer	130
Fluorspar	400
Coke dust	200
Lime—first slag	600
Lime—second slag	600
Dolomite	400
Magnesite	25

Tapped previous heat	7.00 a.m.
Metal ordered for	7.15 a.m.
Metal received	7.15 a.m.
Began fettling	7.17 a.m.
Current on	7.27 a.m.
Slag off—began	8.00 a.m.
Slag off—finished	8.11 a.m.
Tapped	8.48 a.m.
Time of heat	1 hr. 21 min.

A typical furnace charge sheet, as in Table 1, may interest you. It will be seen from this that it takes us an hour and a half or two hours to heat, according to the grade of steel produced.

What is actually done in the electric furnace at the South Works is to take oxidized blown metal of an approximate analysis of

C.	S.	P.	Mn.	Si.
0.05-0.10	0.035-0.070	0.095	0.05-0.10	0.005-0.015

and produce deoxidized steel low in sulphur and phosphorus and within reasonable limits of practically any analysis required by the consumer.

Fig. 5 shows the elimination of the impurities in the electric furnace during the process of making an alloy heat. Fig. 6 shows the fluctuation in the slag analysis.

The Variety of Product

The electric furnace at South Chicago has operated on a greater variety of product than any furnace in the world, and with bewildering intermingling of high grade alloy steels, high grade carbon steels and ordinary carbon steel. We have made of ordinary carbon steel rails of a dozen different sections, billets of all sizes and grades, plates of all sizes and grades, structural shapes, castings, small and large, high carbon and low, and forgings of all sizes. Of alloy steels we have made nickel, nickel-chrome, chrome, manganese and silicon steels.

Perhaps many of you will wonder at the adaptability of this furnace for handling cold materials. We have made a number of heats from cold materials. In several of these we took the worst scrap we could pick up, which appears to us to be stove plate scrap. With this stock axle heat was made which showed excellent physical tests. If I remember correctly, 77 blows from a 1640-lb. hammer falling 43 ft. broke the first axle and 68 similar blows the second.

The Quality of the Steel

The main chemical or physical differences in electric steel seem to be these:

1. A comparative freedom from oxidation.
2. A comparative freedom from segregation.
3. A higher tensile strength and slightly higher ductility for the same chemical analysis up to about 0.40 carbon, where the difference becomes less apparent. See Table 2.
4. A steel of greater density than our other commercial steels, with the possible exception of crucible.

In conclusion let me say that the three electric furnaces of the Steel Corporation are the largest in the world that have as yet been put in operation. They have presented many interesting and complex problems and the manufacturer has encountered occasional troubles. Although we feel that we are as yet but on the threshold of this method of manufacture, we feel that electric steel is a success and its future assured.

The Pope Mfg. Company, Hartford, Conn., now turning out automobiles as well as bicycles, is stated to be doing an unusually heavy business in the latter. In the fiscal year ending July 31, 1910, it shipped 57,000 bicycles. The current fiscal year the shipments will exceed 65,000, and will break any previous year's showing of the company, even in the old days when it was exclusively a bicycle concern, and when that industry was enjoying its boom 16 or 18 years ago.

Table 2.—Statement of Averages of Ultimate Strength and Per Cent. Elongation (in 2 In.) of Electric and Open Hearth Plate Steels. Arranged According to Carbon Analysis.

Electric Plate Steel.					Basic Open Hearth Plate Steel.				
Carbon. Per cent.	No. of heats.	No. of tests.	Average ultimate strength.	Average per cent. elongation.	Carbon Per cent.	No. of heats.	No. of tests.	Average ultimate strength.	Average per cent. elongation.
0.08	3	5	59,194	27.25	0.08	3	5	51,690	32.00
0.09	2	5	59,502	27.25	0.09	2	5	52,570	32.00
0.10	3	5	57,662	29.20	0.10	3	5	54,666	29.90
0.11	3	5	59,585	27.65	0.11	3	5	54,854	30.65
0.12	2	5	64,080	26.05	0.12	2	5	56,510	29.70
0.13	3	18	65,880	25.90	0.13	3	18	56,595	28.54
0.14	3	12	62,030	26.43	0.14	3	12	55,322	28.64
0.15	3	15	61,203	26.70	0.15	3	15	58,683	28.21
0.16	5	27	69,220	25.25	0.16	5	27	52,901	28.61
0.17	5	22	66,638	25.03	0.17	5	22	55,780	28.81
0.18	5	21	65,350	25.44	0.18	5	21	58,469	28.31
0.19	3	15	70,336	23.83	0.19	3	15	59,504	27.50
0.20	2	7	72,853	22.82	0.20	2	7	58,294	28.82
0.21	2	9	68,640	25.16	0.21	2	9	63,050	27.00
0.22	1	2	70,820	25.75	0.22	1	2	54,500	29.75
0.23	2	7	73,370	23.53	0.23	2	7	61,148	27.39
0.24	1	2	69,540	23.12	0.24	1	2	63,560	26.25
0.16 Average of averages.	28	10.7	65,640	25.67	0.16	2.8	10.7	56,947	28.94

The above table shows 15.5 per cent. increased ultimate strength for the electric steel and 11.3 per cent. decreased elongation as compared with open hearth plate steel of approximately the same chemical analysis.

The Reliability of Electric Furnaces*

Factors in Their Development Under American Conditions

BY F. T. SNYDER.†

A few days ago a man who had been in the East attending the meetings of an association of engineers, representing an industry that uses a large amount of high grade steel in various forms, was asked about the electric furnace paper on the programme. He characterized it as "the usual optimistic hopes by the agent of an electric furnace inventor." But without the furnace inventors and without the optimistic hopes that held them for 10 years to the expenditure of time and energy and money that was all outgo and results deferred, there would be no commercial electric furnace work to-day to consider. Moreover, it now seems as though the time had come to point out to those who are less closely in touch than ourselves that the electric furnace has grown beyond a question of this or that inventor; has grown beyond a question of hopes to one of commercial use, and is now a matter of engineering and finance; that to-day the electric furnace has achieved reliability.

The Siemens Electric Furnace

But before the time goes by when particular arrangements of electric furnaces are named after their inventors, as such time has gone by for the open hearth furnace and for the crucible furnace, it would seem proper that we should call by the name of its inventor that simplest of all electric steel furnaces, in which a single electrode above leads the current through an arc to the steel and a metallic contact with the steel bath below leads the current back to the dynamo. Back in 1880, so far back that the paper describing it was read before the Society of Telegraph Engineers, then the only organization representing electrical engineering, William Siemens built and operated his furnace in which the heat of the electric arc was used to melt steel. This little furnace was a practical furnace. It made good steel. A duplicate of it, copied from the old drawings, will work to-day without difficulty, making its little batch of steel. It is especially fitting that to this same William Siemens the steel industry also owes its open hearth furnace, only second in importance to the blast furnace itself.

As the Siemens electric steel furnace was the first practical electric steel furnace, so now it bids fair to be also the furnace to be used in the greatest numbers. It is characteristic of the electric furnace that it is reliable in small units, and it is in this direction that the industry is tending—the making of some steel castings by many of the gray iron foundries; the making of their own steel castings by many of the larger users. In these small installations the simplicity and reliability of the Siemens electric steel furnace will be important. With proper engineering this single electrode type of steel furnace can be built reliably up to 500 kw., producing 250 tons of steel per month with continuous operation. Many more than a majority of commercial installations will be below this tonnage. A worthy use of this opportunity will be to emphasize the good to electrochemistry that has lived beyond the life of this man by calling this type of electric furnace the Siemens furnace.

Commercial Results

Broadly, reliability is commercial, the ability to make a profitable return on an investment. That the electric steel furnace is reliable in this way is emphasized by the growth of those plants in Europe that are making electric steel exclusively. And beyond steel making, the electric furnace has been commercially reliable so long in the aluminum industry that the general patents have run out. The commercial reliability of the electric furnace in the manufacture of carbide has for years been in evidence with each user of acetylene light. Less widely known but commercially profitable has been the electric furnace manufacture of carbon bisulphide, of phosphorus, of graphite, of abrasives, of magnesium for flash lights, of ferroalloys for steel refining, and in the last few years we have seen the reliability of electric furnace operations pledged in the investments of the millions of dollars that are going into the construction of huge electric furnace plants for the production of fertilizers. And it is the commercial reliability of these older electric furnace applications that is back of the reliability of the newer application of the electric furnace to steel. In them was developed the demand that justified the building of electrode factories whose products is now available for steel furnaces. In them was developed the special engineering ability to handle the large electric currents of furnace work. They had their part in the demand for electric current at lower and lower cost. It is these things that have given the Siemens electric steel furnaces of 30 years ago, a technical curiosity then, its standing to-day as a reliable industrial tool.

Technically, reliability is a matter of apparatus and men and supplies. These react on each other. Experienced and skilled men can force poor supplies and indifferent apparatus to a commercial output. Apparatus that is inherently self-regulating will permit the use of such men as can be had at a permissible cost. Supplies that have a factor of safety in their constitution will carry the equipment through an overload. Involved in the question of commercial reliability is the element of time. Results must be prompt.

An American Electric Steel Industry

To make electric steel in the United States means furnaces that are reliable, with American men and American supplies. In the rush of industry reliability cannot afford the time hazard of importation. Europe developed the electric steel furnace industry first, just as it developed the dynamo first, the steam turbine, the large gas engine and steel making itself. There the pressure of competition for opportunity, the abundance of trained technical men and the low cost of capital force enterprise. Safely we may look in America for the same swift overtaking of achievement with the electric steel furnace that has characterized other technical developments. For this reliable American electric furnace supplies are now available and tested. American electrodes can be had in sizes as large as furnace requirements call for. Refractories made in this country have been developed with an ability to stand up well under the higher temperature of the electric steel furnace. Campaigns with roofs of American brick have run into months as against weeks for European practice.

Skilled electric furnacemen are scarce. The rapid installation of furnaces more than absorbs the few who have had an opportunity to become experienced with electric furnaces working in commercial operation. Trials with electric furnacemen imported have not been wholly satisfactory. The drive of the American steel plant does not seem to fit with the methodical nature of the foreign technician. This shortage of skilled furnacemen at permissible costs has thrown more of the burden on the apparatus, has directed American electric steel furnace design toward inherent self-regulation, as we say electrically; toward reliability, as the investor looks at it; toward making it "fool proof," as the man on the job phrases it. Furnace detail that works very well in Europe, with the skilled help available there, has to be designed here to work with the help that can be had. This inherent reliability can now be carried to an

* A paper read before the Chicago Section of the American Electrochemical Society.

† Metallurgic Engineering Company, Chicago.

extent that permits taking a steel melter from a crucible or open hearth furnace and putting him on an electric steel furnace, with the assurance that within a week he can be making salable steel regularly. This does not mean making an electrician of him. Actually he knows no more of electricity than he knew of the kinetic theory of gases in his open hearth work, but he does know that when the wattmeter needle is in a certain position he has a supply of heat in his furnace, and hot heat at that, and heat that, hot as it may be, will not burn his steel.

Better Steel

But a reliable furnace and reliable supplies and reliable melters are not all of the commercial reliability of electric steel. The steel produced is different from crucible steel. It is different from open hearth steel. If it were not different the electric furnace would not be used. It is true that under favorable conditions steel can be made cheaper with an electric furnace than in other ways; but the fundamental reason that is speeding electric furnace construction is that the steel is better. Being better means differing chemically, differing physically from the steels of the other furnaces, and this difference chemically and physically must be reckoned with in the subsequent processes the steel goes through. In the foundry the molding must be done for this new material. It is freer from gases. It usually is hotter. The tendency is to lower the carbon for the same tensile strength, and this makes it set at a higher temperature. The improved elimination of phosphorus and sulphur tends in the same direction. In the forge and rolls electric steel shows its additional strength and toughness.

It must be handled from the point of view of its characteristics. It is a mistake simply to consider the electric steel furnace as a substitute for some other kind of a melting furnace. Its introduction can be counted on to mean changes of method, as far as the steel is followed in manufacturing processes, and unless this is clearly recognized there will be disappointment and the reputation of the electric furnace for reliability will suffer.

Electric Furnace Construction No Experiment

From a still narrower technical point of view, reliability means freedom from actual breakdown, from the enforced necessity of change in construction and the consequent loss of time and productive capacity. As to this, electric furnace design is now on an engineering basis. Dependence on experiment is now a matter of volition on the part of the investor. It is no longer a necessity. As a piece of engineering apparatus an electric furnace can now be more closely designed to meet narrow specified operating conditions than can on open hearth furnace.

In a recent instance an electric furnace and a small open hearth were installed side by side in a new steel casting shop. The open hearth gave trouble and has been replaced by a better design. The electric furnace, although not of most modern design, has operated without need of alteration. Those details in which an electric furnace differs from established open hearth practice—the electrode holders, the electrical regulation, the contacts with the bath of steel—are now rugged and simple. Electrode holders are in evidence that operate with less than one hour's lost time in a hundred heats.

The Record of a Western Plant

Recently I have had occasion to examine carefully in detail the condition of a plant using electric furnaces exclusively, that started operation on a commercial scale in the summer of 1907, and that is quite aged as electric furnace design goes. It is proposed to double the size of the unit and increase the size of this plant fivefold; and this examination was made to determine from the condition of the plant and the operating history what changes in the original design could be made to advantage in the extensions. Incidentally, the examination disclosed a condition of continuing reliability that is worth recording. Substantially all of the original equipment was still in use. The plant, which is in the West, has been operated since its installation by Chinese labor under a white superintendent, and neither the superintendent nor the Chinamen knew more of electricity than is involved in the opening and closing of circuit breakers and the reading of ammeters and voltmeters. One of the power transformers had been replaced, but it was learned after its removal that the trouble was an abraded spot on a terminal that could have been readily repaired on a Sunday at the plant. This particular plant, while not a steel plant, is of interest in showing on many of its operating records a heat development efficiency of over 90 per cent.—that is, of the heat equivalent of the energy delivered to the plant by the high potential electric wires, over 90 per cent. is transferred to the material under treatment.

Cheap Electricity a Prime Factor

It is to be expected that the success of this new and flexible tool of industry will lead to over enthusiasm and to its application in wrong ways and in wrong places, and that its failure as a panacea for troubles it has properly nothing to do with will bring setbacks. But back of its present success is the cause of that success, the steadily lowering cost of electric current. Thirty years ago the furnace of Siemens worked as an apparatus. It was not until the cost of current dropped below the figure at which the electric furnace was commercially reliable in this country that its industrial application began and its engineering side developed. This dropping of the cost of electricity is still going on, and as it goes on it brings a greater and greater motive force to bear on the installation of electric furnaces. At the same time, unfortunately for industry in general, but fortunately for the electric furnace, the cost of fuel for direct and gaseous heat is slowly but steadily rising.

Summed up more briefly, the facts that an investigator of electric furnace results may expect to find are:

1. That the electric furnace itself has passed from the field of experiment to that of engineering, but that the fields of manufacture using the electric furnace products are still experimental.

2. That the electric furnace is technically reliable and will operate continuously with the men and supplies that are available in this country. That the details are simple and rugged, and that the inherent regulating powers can be made such as to bring it well within the ability of usual plant labor.

3. That the electric furnace is commercially reliable. That when installed with the same business care and adaptation to conditions that should be used with other furnaces, it will earn a profit on the investment, and a profit that is larger than the normal manufacturing profit in proportion as the field is more open.

Copper Consumption.—President Daniel Guggenheim of the American Smelting & Refining Company has given the press his views on the development of the copper industry and the outlook for it. He says that the demand in Europe was greater last year than in any previous year. Business in Europe prospered throughout the entire year, and industries which consume copper were more active and aggressive than ever. While the buying of copper was more spasmodic in this country than in Europe last year, the consumption had increased in this country about 10 per cent. over 1909. He makes the interesting statement that 50 per cent. of the copper consumed is used in electrical industries, 35 per cent. in the manufacture of brass sheets and tubes, 7 per cent. in copper sheets and other finished products and 8 per cent. in brass castings.

At the annual meeting of stockholders of the Harbison-Walker Refractories Company, held in Pittsburgh last week, the following directors were elected: H. W. Croft, Hamilton Stewart, O. M. Rief, L. C. Turley, J. J. Brooks, Jr., George W. Reese, H. F. Bigler, J. E. Lewis, T. H. Given, R. W. Harbison, T. L. Chadbourne, Jr., Hay Walker, Jr., Hay Walker, William Walker and N. McQuillen. The board organized by re-electing these officers: President, H. W. Croft; vice-presidents, Hay Walker and O. M. Rief; secretary, Hamilton Stewart; treasurer, William Walker.

Electrolytic Iron*

Can It Be Made an Industrial Product?

BY CHARLES F. BURGESS.†

During the past five years investigations have been carried on in the chemical engineering laboratories of the University of Wisconsin, dealing with electrolytic refining of iron and its use in the production of alloys. About 3 tons of iron have been refined and over 1000 alloys produced and tested. While this experimental work has been on the "test tube" or laboratory scale, it is believed that some of the results indicate the feasibility of enlargement to commercial state, and a short discussion is submitted here bearing on the question, "Can electrolytic iron be made an industrial product?"

Many old textbooks on electro-chemistry give descriptions of methods of depositing iron electrolytically, implying, therefore, that electrolytic iron is not a new product. The only use suggested, however, is for facing engraved plates used for printing. By following any of these earlier processes it is seen that only very thin layers of iron can be deposited, the coating tending to become dark, rough and powdery. It is to overcome this limitation that the work at the University of Wisconsin was undertaken, and that this has been successful, in a measure, is indicated by an iron cathode nearly 2 in. in thickness.

The Field for Electrolytic Iron

The manner in which electrolytic refining has revolutionized the copper industry is now an old story, and electrolysis has likewise become an industrial agent in the metallurgy of silver, gold and lead. Now, that it has been found that iron can be refined electrolytically almost as easily as copper, it is pertinent to inquire whether there is a field of usefulness for such iron. This depends upon whether electrolytic iron has superior qualities due to purity or physical condition, and whether it can be procured at low cost.

From the standpoint of purity it must compete with some notable metallurgical developments which have resulted in product such as being made by the American Rolling Mill Company in a basic open hearth process. For this material a purity of 99.94 per cent. is claimed, and justifiably so, as some of our analyses show. The electric furnace is another factor which is contributing largely to the control of the composition and purity of iron alloys, and the striking possibilities which are offered in this developing field cannot be overlooked in advocating the development of an electrolytic iron process.

The chief source of commercially pure iron has been and, perhaps, now is, the high grade Swedish and Norway iron, used largely as a base material for high grade crucible steel. The analyses of this material usually indicate a high purity, though frequently and erroneously calculated by difference, after determining carbon, sulphur, silicon, phosphorus and manganese. It is not uncommon to find oxides and slag to the extent of 2 per cent. in this material, and this impurity undoubtedly may have an influence on the resulting alloys made from it.

Electrolytic Iron 99.97 Per Cent. Pure

We have found that electrolytic iron can be produced with a purity as high as 99.97 per cent., and, perhaps, even better, using extraordinary precautions. This record has been made by using the best commercial grades of pure iron as anodes. A few hundredths of 1 per cent. of purity must be sacrificed in using anodes of mild steel or other less pure materials. Electrolytic refining offers a means of reducing or screening out most of the impurities commonly found in iron and of producing a material not only of high purity, but of great uniformity. Even though it may be shown eventually that electrolytic iron may not have a higher purity than that attainable by other methods, the uniformity of its composition should make it a valuable material as a means of eliminating many of the variables with which the crucible steel maker has to contend.

Using an electrolyte containing 40 g. of iron per liter in the form of ferrous sulphate, together with 40 g. of ammonium chloride, it has been found possible to conduct a continuous refining operation for many months at a current density of 6 to 10 amperes per square foot of cathode surface, and at a potential difference of about 1 volt. The current efficiency is very close to 100 per cent., as it is in copper refining.

A Calculation of Cost

This leads to the calculation that 1 kw.-h. will refine 2 pounds of iron; or a cost for power of ½ cent per pound is attainable. The costs for labor, solution maintenance and fixed charges are estimated to be not greater than the power costs, making a cost of refining of about $20 per ton. Assuming the anode material to be a mild steel costing $35 per ton, the cost of electrolytic iron would be in the neighborhood of $55. These approximate calculations indicate that this material might well compete in price with high grade Swedish iron.

Among the properties of electrolytic iron which may give it some added usefulness is its content of hydrogen and the brittleness which results from this occluded gas. This hydrogen may be of some service in reducing oxides in a melt. The brittleness of the electrolytic iron before the hydrogen is driven off makes it easy to break it up into pieces suitable for introduction into the steel crucibles.

* A paper read before the Chicago Section of the American Electrochemical Society, Jan. 20, 1911.

† Professor of chemical engineering University of Wisconsin.

The All-Geared Multi-Spindle Drill

Especially Designed for High Speed Drilling

Adjustable multiple spindle drilling machines occupy an important place among manufacturing tools, for they allow all of the holes in one piece to be drilled in the time required for one with an ordinary drill press. The All-Geared multi-spindle drill illustrated in Fig. 1, a new design offered by the Walter H. Foster Company, 50 Church street, New York City, is designed especially for the use of high speed steel drills to their maximum capacity without undue strain or wear on the adjustable and moving parts. The substitution of gears for uni-

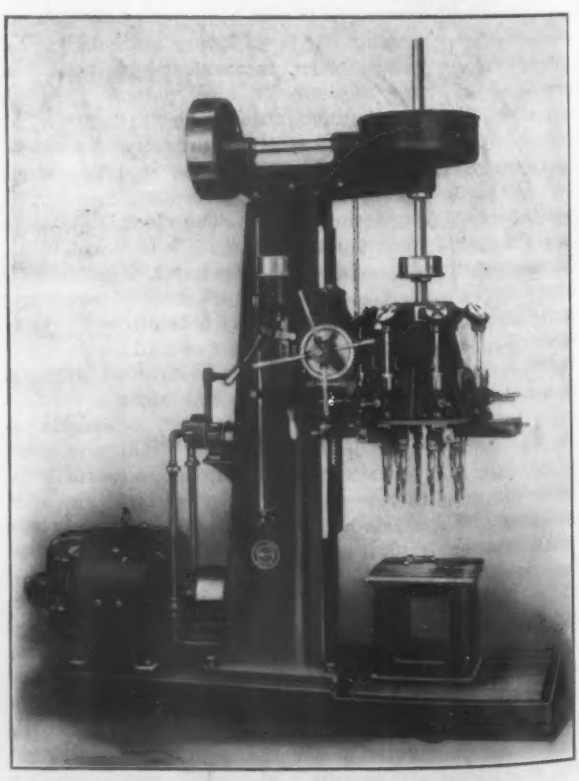


Fig. 1.—The All-Geared Multi-Spindle Drill Sold by the Walter H. Foster Company, New York.

versal joints, the introduction of steel where cast iron was formerly used, and the improved method of adjusting the spindles to any desired position, either horizontally or vertically, are the more important features.

The base has a working surface of 28 x 30 in. with an oil groove around it, connecting with an oil receptacle cast integral with the base. An extension at the rear of column supports a motor or countershaft, as the case may be. The column is of heavy box section mounted on the base, and contains a counterbalance for the drill head.

As illustrated the power is transmitted from a two-to-one 5-hp. variable speed motor through a 4-in. double belt to a 16-in. pulley. An oil pump located on the rear of the column is belted direct from the motor or countershaft. The spindle head is of conical box pattern, with ample bracing to insure rigidity, and has a bearing surface on the column of 9 x 20 in., and has adjustable gibs to compensate for wear.

Referring to Fig. 2, the feed drive is taken from the pulley *a* to the pulley *b* and through the gears *c* to the gears *d*. The latter running continuously, but loose on their shaft, may be selectively engaged to the vertical shaft *e* by a diving key controlled by the lever *f*. Through two bevel gears on the lower end of the shaft *e* and a positive jaw clutch controlled by the handle *g* the feed transmission continues to the horizontal shaft *h*. This carries a hardened steel worm, which drives a large bronze worm wheel which is integral with its shaft and

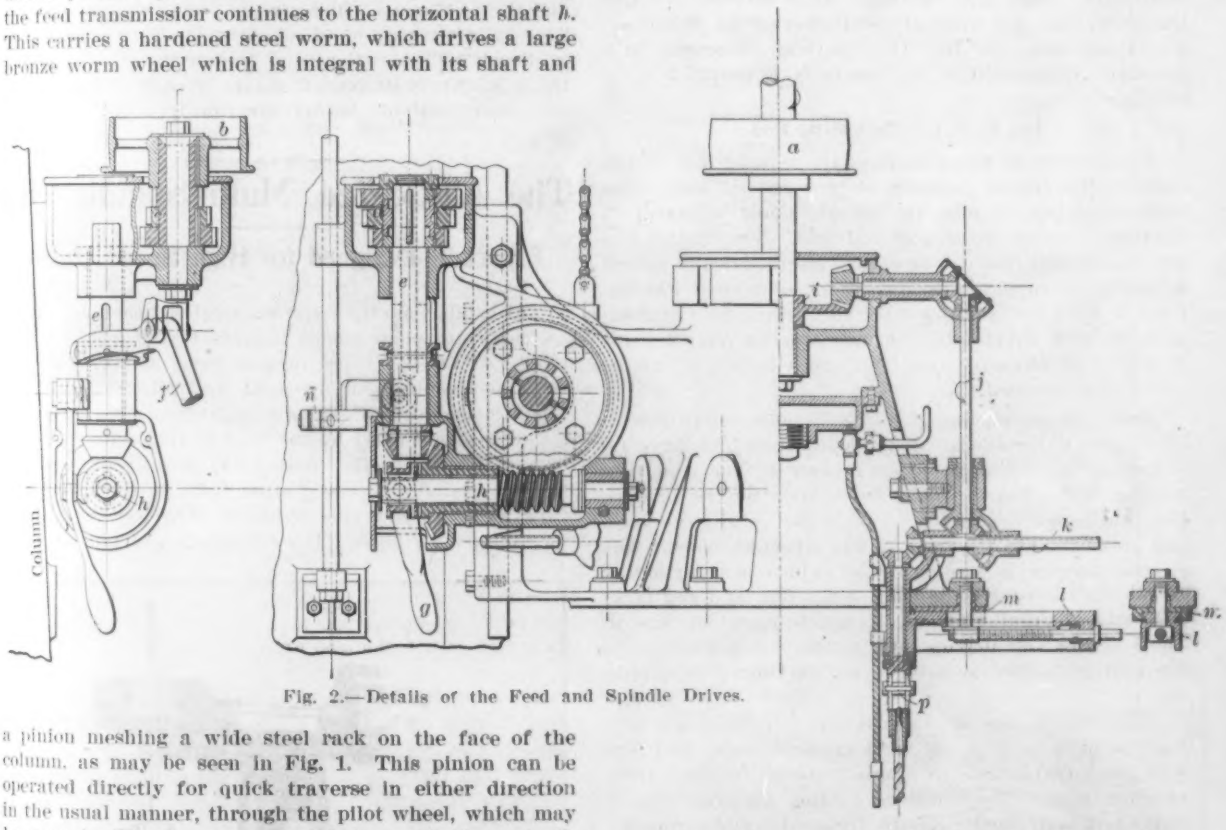


Fig. 2.—Details of the Feed and Spindle Drives.

a pinion meshing a wide steel rack on the face of the column, as may be seen in Fig. 1. This pinion can be operated directly for quick traverse in either direction in the usual manner, through the pilot wheel, which may be seen in Fig. 1, engagement being made by a tooth clutch. The power feed can be set to be tripped at any point by setting the adjustable dog *n* to contact with an arm on the lever *g*.

Fig. 2 also shows the details and transmission of the spindle drive. The shaft carrying the pulley *a* also carries the large bevel gear *i*, which is in constant mesh with eight bevel pinions on horizontally radiating shafts equal distances apart. Through miter gears the drive is transmitted to eight vertical shafts, *j*, then to eight horizontal shafts, *k*, and finally to the individual spindles. The horizontal shafts *k* have longitudinal adjustment in their supports to allow the drill spindles to be located at various distances from the center, and they also have angular adjustment in a horizontal plane, so that the drill spindles may be placed at various distances from one another. Between these two adjustments it is possible to set the spindles in any regular relation, circular, square, rectangular, or in a straight line, or any irregular arrangement within the limits of the maximum adjustments. The small bevel gears are of chrome nickel steel, hardened and incased, thus permitting them to run in lubricant.

Particular attention is called to the method of attaching the spindle carrying arms to the drill head. The arm itself (*l*, Fig. 2) is a steel casting, and the intervening saddle *m* is machinery steel, with a projection or pintle which serves to maintain the vertical position of the spindle, while the nut is loosened for adjustment to position. The arm is carried in the saddle by a dovetail, and the head of the binder screw is a nut in which the horizontal adjusting screw is operated.

The vertical adjustment of the drill socket in the spindle, shown at *p*, in Fig. 2, is new in multi-spindle drills, and of special value, enabling the operator to start with all drills cutting at the same time, and providing for a considerable range of stepped drilling; this adjustment is 1½ in. in each spindle, and is accomplished by turning a knurled nut.

For drill lubrication a central oil reservoir is provided in the spindle head, and oil is conveyed to each drill through spiral flexible hose; a valve controls the supply to each spindle. All spindles and driving shafts run in bronze bushings, and the bearings have ample and accessible lubricating facilities. The drill spindles have Hess-Bright radial and thrust ball bearings and the feed worm a thrust ball bearing.

The capacity of the machine illustrated is ¼ to ½ in. high speed drills within a 12-in. and outside a 4½-in. circle; the least center distance between spindles, 1¾ in. Other standard sizes are furnished with 4, 6, 10 and 12 spindles, suitable for drilling 1-in. holes, the largest inside of a 24-in. circle, and outside of a 9-in. circle, and also a standard head for 12 and 16 ½-in. holes in a rectangular surface 16 x 20 in. The box table is 16 in. square by 16 in. high.

In the machine illustrated the maximum distance from the spindle to the bed is 42 in. and the minimum 16 in. From the face of the column to the center of the head is 14 in. The drill spindles have No. 1 Morse taper sockets. The three drill speeds are 300, 450 and 600 rev. per min., and the three feeds 0.005, 0.008 and 0.011 in. per revolution of the spindle. The overall hight of the machine with the head in its highest position is 8 ft. 10¾ in.; the floor space is 3 x 7½ ft., and the net weight 3600 lb.

The Girard Iron Company has blown in its furnace at Girard, Ohio, which has been out some months for repairs and improvements.

The Cincinnati Boring Mill

An Extension to the Lines of the Cincinnati Planer Company

The manufacture of boring mills has been commenced by the Cincinnati Planer Company, Oakley, Ohio, and several sizes have been brought out. Among these is a 10-ft. mill, a front view of which is given in Fig. 1. Fig. 2 shows the driving gear, Fig. 3 illustrates the adjusting mechanism provided for the head, while Fig. 4 is a rear view of the tool giving some idea of the massive construction of the housings, and showing the arrangement of the controlling levers.

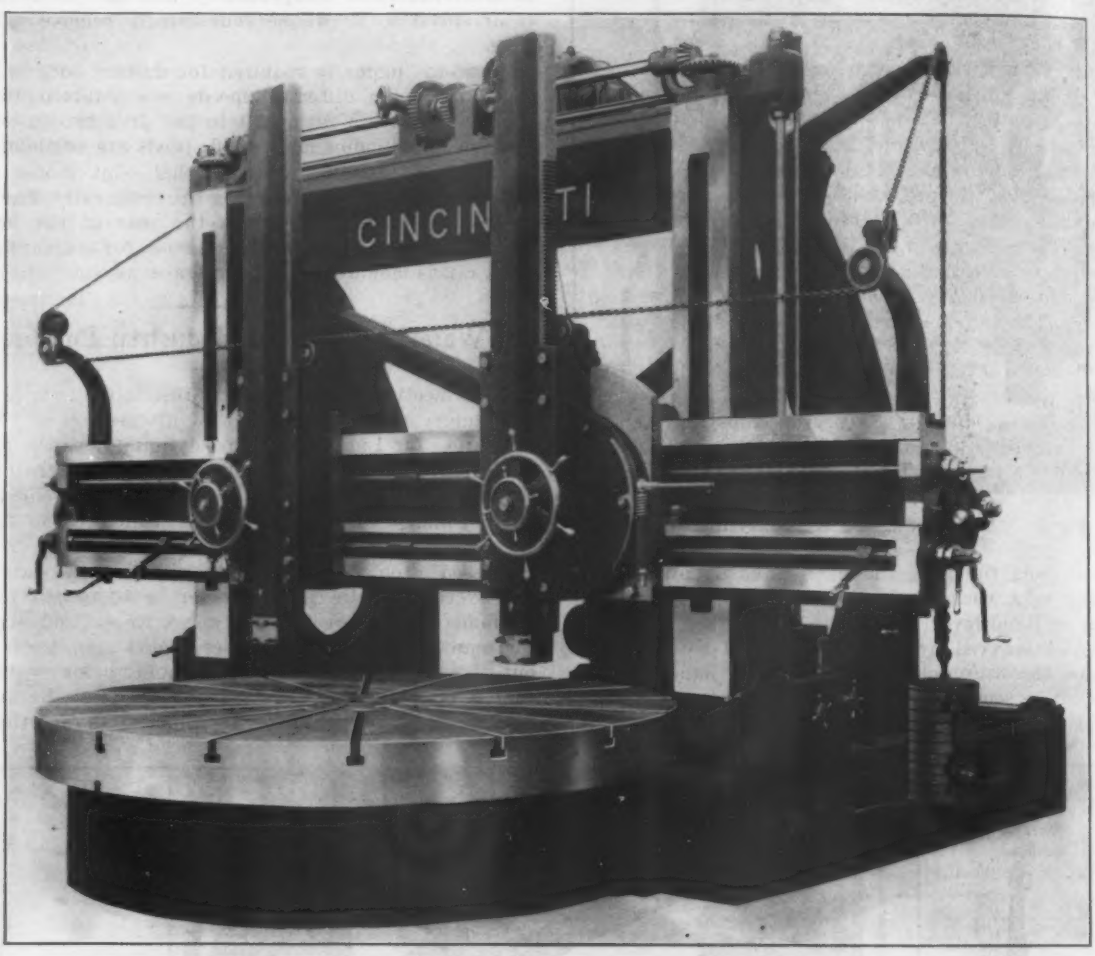


Fig. 1.—Front View of a New Boring Mill Built by the Cincinnati Planer Company, Oakley, Ohio.

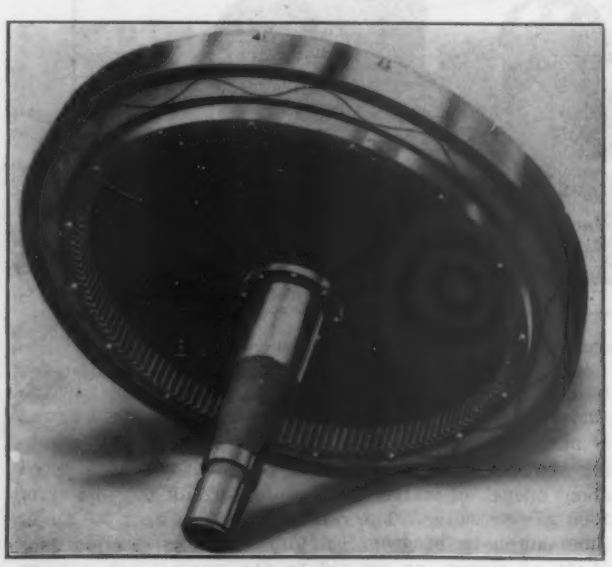


Fig. 2.—The Driving Gear of the Mill.

As will be noticed from Fig. 1, the bed is of the box type, 21 in. in depth and all parts are thoroughly ribbed and braced, an I-beam construction of liberal thickness being used instead of the customary channel sections, which are more apt to spring. The table is 10 ft. in diameter and 10 in. deep at the edge. It is supported on a broad, flat bearing 9 ft. 5 in. in diameter, and the large center spindle revolves in a bushed bearing which is adjustable for wear. A step bearing is provided at the bottom for adjusting the load on the stump of the spindle, which is not changed after setting.

A special feature is the manner of lubricating the track on which the table travels. Three pockets are cored in the bed to receive the automatic oiling devices. These pockets are filled from the outside, and are so arranged that the operator can see the amount of oil they contain, and he can thus be sure that the track is receiving the necessary lubrication at all times. This arrangement does away with the periodic flooding of the track with an oil can, and also obviates the necessity of raising the table from the track to clean off the gummed oil. The pockets can be drained and thoroughly cleaned at any time by simply inverting the inlet pipe.

The driving gear is inside, and as Fig. 2 shows, this arrangement avoids the lifting tendency developed in machines where the table is driven by a bevel gear. All pinions have a large number of teeth, thus insuring a smooth motion to the table.

The cross rail is 30 in. deep, is of box form and has an arch on the back to take care of the weight of the heads or strains from heavy cuts. It is clamped to the housings, both on the outside and inside edges. The rail is thus rigidly secured at its weakest point.

The tool heads have a 34-in. bearing on the cross rail. The guiding surfaces for each head are on the lower part of the cross rail, which is readily understood to be especially advantageous when the tool bars are extended some distance below the rail. The tool bars are of cast steel and have a travel of 48 in. Each bar is separately counterweighted. Both the heads have rapid

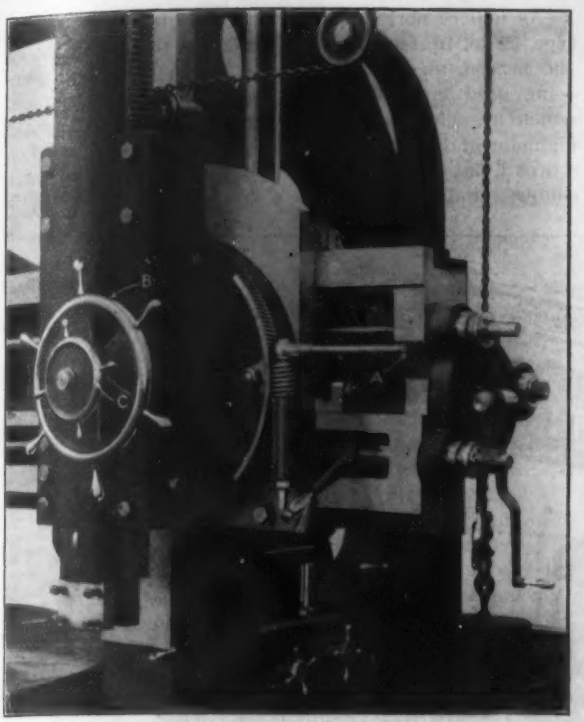


Fig. 3.—The Adjusting Mechanism for the Head.

traverse along the rail, and each is easily adjusted to any angle by a worm gear and gear segment, operated by the ratchet hand lever A, Fig. 3. The tool bar is quickly elevated or lowered by the capstan hand wheel B, and the power thrown on or off by the smaller hand wheel C.

As will be seen from Fig. 4, the housings are of massive box form. They have a 12-in. face and a wide and deep base, thus insuring rigidity under the most severe duty. In addition to the usual top brace, the manufacturer has provided an unusually heavy cross brace at the back of the housings, which is designed to take care of all side strains, due to heavy cuts made when the cross rail is raised some distance from the table. An original feature of the design is mounting the feed boxes on the housings instead of on the housing base. This does away with the necessity of the operator being compelled to creep under the work to operate the feed levers. Eight changes of feed are provided, ranging from 1-32 to 1 in. in any direction.

The company also builds an extension mill having a range of from 10 to 16 ft., that has all the general features of the 10-ft. mill just described. The housings are moved back and forth by power, giving a capacity of 16 ft. 3 in. when they are extended to the limit, and will take work 5 ft. 6 in. high. The extension arm is of very heavy construction, and is provided with an auxiliary swiveling head and a tool bar 6 in. in diameter, having a stroke of 48 in. with vertical head and power feed. It is counterbalanced independently, and the extension arm is arranged so it can be conveniently removed at any time.

A 25-hp. motor is required for driving both of these mills, and nine different speeds are obtained through a gear box with a ratio of 1 to 18. If a two to one adjustable speed motor is used, 40 speeds are available with a ratio of 1 to 36. An additional 6-hp. motor is required for raising and lowering the cross rail. The main driving motor is mounted on the rear of the bed, as shown in Fig. 4, while the motor for adjusting the cross rail is mounted on the top brace, as shown in Fig. 1.

Water Filtration for Industrial Purposes

The meeting of the Franklin Institute on the evening of January 18 was devoted to the discussioon of "Water Filtration for Industrial Purposes," and a paper on that subject was read by Churchill Hungerford, filtration engineer of Philadelphia. The paper dealt with some of the extraordinary forms of pollution which cause trouble in certain manufacturing processes, but in the main it discussed problems of purification of such waters as the average textile manufacturer is compelled to use. A number of interesting instances were cited showing the manner in which impurities are so completely taken out of water contaminated by manufacturing operations that it is made even more satisfactory than the municipal supplies of the towns in which the factories are located. Interesting data were given relating to the amounts of water required by different industries. A pound of muslin or similar cotton fabric requires in the bleaching about 27 gal. of water. A pound of paper requires about 50 gal. of water and a pound of silk not less than 1000 gal. of water. The use of chemicals, such as alum, lime, sulphate of iron, calcium hypochlorite and sulphate of copper, as an aid to the purification process was dicussed, and a detailed account given of the manner in which these chemicals are completely removed from the water after they have done their duty. A description was given of a filter plant capable of handling highly polluted waters.

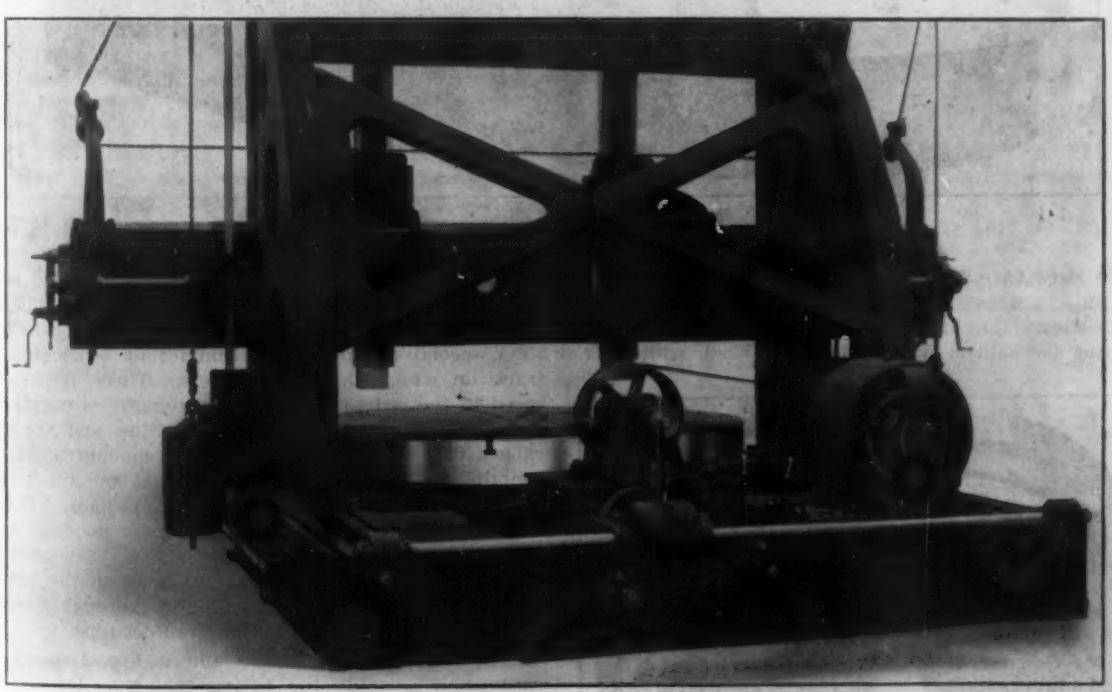


Fig. 4.—Rear View of the Mill, Showing the Massive Construction of the Housings.

S. DIESCHER & SONS.
Mechanical and Civil Engineers
PITTSBURG

Some Adaptations of the Pratt & Whitney Thread Miller

Milling Internal Threads and the Cutting of Spiral Gears Are Now Possible on This Machine

The Pratt & Whitney Company, Hartford, Conn., has recently developed an attachment by which it is possible to mill internal threads on any of its standard thread milling machines. Great flexibility characterizes the attachment, and by its use it is possible to increase the value of the machine for doing this class of work. Fig. 1 shows one of the maker's standard thread millers equipped with this attachment, and Fig. 2 gives some idea of the character of work which a machine so equipped is capable of turning out. Fig. 3 shows the standard 6 x 14 in. Pratt and Whitney thread miller arranged to cut spiral gears.

The construction of the cutter head, which is made as a separate and complete unit, is very rigid throughout. The head is designed to be readily accommodated to the

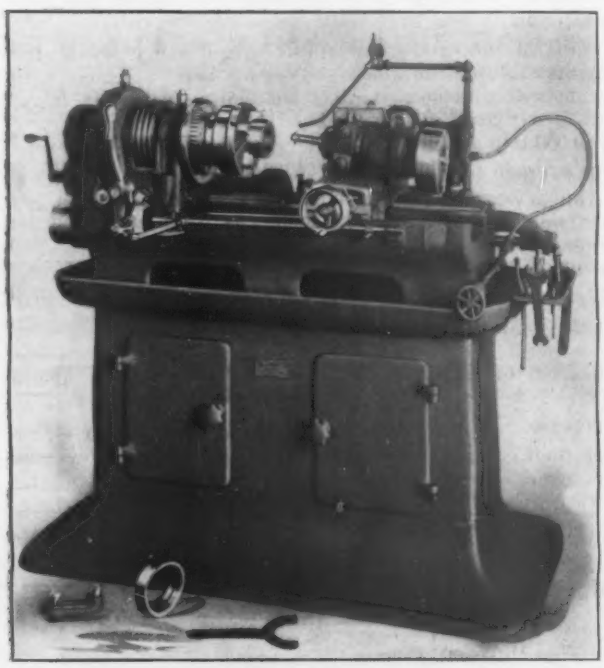


Fig. 1.—A Thread Miller Equipped with the Internal Thread Milling Attachment Developed by the Pratt & Whitney Company, Hartford, Conn.

regular carriage, and the proper relation between the two is maintained by long dovetail bearings and a taper gib capable of easy adjustment to compensate for wear. The mounting of the cutter head proper enables the necessary swiveling action for proper cutter clearance to be obtained without disturbing the central relation of the cutter and the work and accurate graduations are provided. Once the cutter head has been set to the required angle, as indicated by these graduations, it is securely clamped in its seat by powerful holding bolts, thus giving the equivalent of a solid member.

Very accurate and positive control of the cutter head is secured by a micrometer dial and a positive adjustable stop. The construction of the latter is novel and yet at the same time simple. Its use enables the cutter to be withdrawn from the work and accurately returned to the exact previous depth, a feature that has proved especially valuable on internal thread work. The automatic control of the longitudinal movement of the carriage, as well as a quick return has also been embodied in the construction of the head. Three cutter speeds are secured by a three-step cone pulley, and for each of these speeds 18 carriage feeds are instantly available through a gear box.

The tool steel spindle is hardened, ground and lapped and special care was taken in its manufacture to insure

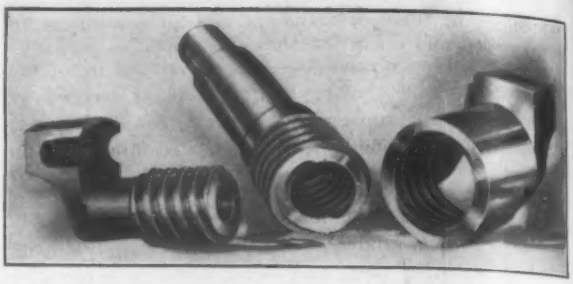


Fig. 2.—Some Specimens of Work Done by the Attachment.

accuracy and durability. A taper hole extends through the spindle to receive the cutter arbors, which are held in place by a drawback bolt. The spindle runs in a bronze sleeve or box and is so mounted in the head as to enable the spindle to be adjusted longitudinally when resetting the cutter to a thread that has been previously cut. The main driving shaft transmits its power directly to the cutter spindle through gearing, a way which has proved very satisfactory. A flywheel which is mounted in bearings independent of the spindle is employed to eliminate backlash in the driving gears and to prevent vibration and chattering of the cutter.

Either single or multiple threads can be cut on this machine. When the latter are being cut, as is the case in Fig. 1, the work holding appliance is carried on the inner spindle. For cutting any desired multiple thread the outer spindle has an index ring which is very large in proportion to the diameter of the work operated upon. Although the design of the spindle is such as to readily lend itself to the accommodation of the various holding appliances required by the different classes of work, the step chuck and closer shown in place on the machine has proved very efficient for work within its range. As will be noticed, this step chuck has adjustable jaws that are independent of the closing mechanism, and once these are set to the desired diameter or contour, the work will be held rigidly and true. A drawback rod from the back of the spindle furnishes a rapid and convenient means for operating the chuck.

As regularly made, the attachment is suitable for threading holes ranging from 1½ to 6 in. in diameter, with single or multiple threads of either the right or the left hand types. Fig. 2 contains a striking example of some pieces out of the ordinary run of work which were threaded by this new attachment at a fraction of the cost of doing the work previously.

Fig. 3 shows the Pratt & Whitney 6 x 14 in. thread miller arranged for cutting spiral gears. This machine is said to be very convenient and efficient in operation.

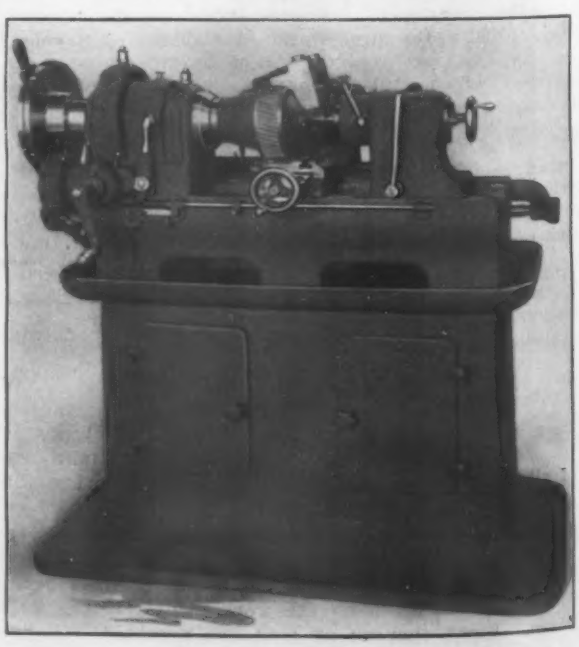


Fig. 3.—The 6 x 14 In. Pratt & Whitney Thread Miller Arranged to Cut Spiral Gears.

as the change gears and other operating mechanism are very simple in their construction and so convenient in their location and operation that one workman can take care of several machines. Another special feature of the machine is its exceptional rigidity, which is secured by a rigid manner of supporting the work coupled with a stiff cutter head, a combination that has resulted in practically eliminating vibration of the work and chattering of the cutter.

The indexing is accomplished by varying the relation between the inner and the outer spindles and is controlled by an index plate and pawl, which is said to be better than indexing by gears. The index plates used have a very large diameter as compared with that of the gears to be cut, an arrangement which reduces errors to a minimum.

The quick return device is actuated by a crank at the front of the machine and is very rapid in its operation. Precision lead and cross feed screws are furnished and a micrometer dial and positive adjustable stops provide accurate control for the cutter head. The cutter has three different speeds and 18 carriage feeds, for each of the three cutter speeds are rendered instantly available by a geared feed box, thus giving a total of 54 feeds. In this machine it is possible to use a very fast feed without sacrificing the quality of the work, as the cutter is so located as to prevent the chips from interfering with its operation.

European Steel Syndicates

In discussing the proposed Italian steel syndicate, whose organization is now well under way, the London *Iron and Coal Trades Review* has the following concerning the syndicates in other European countries. The reference to the United States Steel Corporation in this connection is, of course, pertinent in so far as it represents a large output of steel products under the control of one organization:

The latest iron and steel producing country to organize its industry into a syndicate is Italy. It is announced that negotiations are already well advanced and it is hoped will be completed in the early months of this year, for the formation of an Italian steel syndicate on the model of the German Stahlwerks-Verband. The principal groups of works interested in the project are the Terni-Elba-Savona, the Piombino and the Ferriere Italiane. These various works together have a productive capacity of more than 50 per cent. of the demands of the country. The syndicate would embrace in its scope structural shapes, rails, merchant bars and plates. In addition, there will be organized opposition to foreign competition, and suggestions are being placed before the government for an increase of the import duties. Finally, the large works—Piombino and Savona—will associate in the production of descriptions of iron and steel which still continue to be imported from Germany in considerable quantities, such as steel castings, boiler plates, railroad material, tubes, forgings, &c.

Italy is thus practically the last of the important producers of iron and steel to adopt the syndicate system. In all others, except our own, the system already obtains. The United States Steel Corporation and the German Stahlwerks-Verband are too well known to need any comment in these columns. The Belgian steel syndicate or the Comptoir des Aciéries Belges, has now been established for some years. Its provisions are drafted on the German model, the main feature being that it acts as a sales bureau for undertaking business on the common account of the constituents, and also regulates production. It embraces the Angleur, Boel, Cockerill, Couillet, Ougrée-Marihaye, Providence, Sambre et Moselle, and Thy-le-Chateau Works. French industry is well organized, although on rather different lines. For the export trade one of the most important organizations is the Comptoir d'Exportation des Produits Métallurgiques, which has its headquarters in Paris. This organization looks after the sales of rails, joists and channels. The Comptoir des Tubes en Fer et en Acier, which embraces the four large makers, deals with the tube trade. There are also organized the Comptoir des Essieux (axles), which embraces 15 manufacturers, and the Comptoir des Poutrelles (joists), which embraces 19 manufacturers, and which also deals with channels.

All these syndicates have their head offices in Paris. The Comptoir des Métallurgique Longwy embraces all the firms in the Meurthe-et-Moselle district. These may be said to be the principal syndicates, but the French ironmasters have the Comité des Forges de France, a very important association, which, while not dealing with the selling side of the trade, is available for any concerted action. This also has close relations with subsidiary committees. In like manner Sweden has the Jernkontoret. The main district in Russia is the South, where the nine principal works—the Russo-Belge, Taganrog, Providence Russe, Hughes, Makeefka, Donetz-Jouriefka, Briansk and Oural-Volga—have formed into a syndicate. The Austrian trade is controlled by a syndicate, which is comprehensive, the bulk of the output being in the hands of about half a dozen firms. The Spanish steel trade is also regulated by an association, which embraces the Altos Hornos de Vizcaya, Duro Felguera, Mieres, San Francisco del Desierto, Moreda y Gijon, and several smaller works, making 10 in all. The Altos Hornos holds a commanding position in the syndicate.

If the proposed syndicate is formed and is successful in maintaining the home market for home consumers, it is bound to seriously affect the import trade of Italy. In recent years we have sent to Italy an average of over 200,000 tons of iron and steel, whereas Germany has sent an average of just under 300,000 tons, and Belgium an average of between 40,000 and 50,000 tons. Our exports to Italy are principally pig iron and scrap, and we are, therefore, much less likely to be affected than Germany, whose trade takes the form of more finished products. We send to Italy, however, consignments of ship and boiler plates from time to time, and, of course, also a considerable tonnage of tin plate, but since Italy commenced the manufacture of tin plate herself the quantity of British tin plate has not shown a tendency to increase. No doubt in time the Italians will aim to make all their supplies of pig iron, but at present they are likely to have to continue to import considerable quantities from this country as the raw material for their steel industry.

McWane's Handbook for Cast Iron Pipe Users

The McWane Pipe Works, Lynchburg, Va., has issued a book which classifies and tabulates in convenient form its full line of standard cast iron pipe and special fittings. The contents also include the standard specifications for cast iron water pipe; dimensions and other data of standard bell and spigot pipe, standard cast iron water pipe, crosses, tees, &c.; dimensions of cast iron flanged pipe and flanged specials; details entering into the cost of pipe laying as determined by actual practice under varying conditions. A number of tables are presented covering data of use to engineers, although it is stated that no attempt has been made to furnish information regarding water and gas works construction. Illustrations are given of special products of the company. The McWane Pipe Works is a department of the Lynchburg Foundry Company, having foundries at Lynchburg and Radford, Va. The company maintains branch offices in New York City and Chicago. The book is a publication of 64 pages, is of convenient size for pocket use and bound in flexible leather covers. The company has also issued a large wall calendar, on which is reproduced in colors the painting by Mosler of "Washington in Time of Peace," which shows our first President in a family group.

The H. K. Porter Company, Pittsburgh, is building five 10 x 14 in. cylinder mogul locomotives for the United Fruit Company, to be used on its railroad running from its large fruit plantations to the seacoast in Central America.

Electricity in the Machine Shop*

Its Applications and Savings Effected by Its Use

BY C. W. JOHNSON, PITTSBURGH, PA.†

Outlining a paper on this subject which will be of value to the shop man I have found difficult. The trade journals and engineering societies have published much on the subject, and I have considered it advisable to refer to the most satisfactory of these published papers, which were read before a joint meeting of the American Society of Mechanical Engineers and the American Institute of Electrical Engineers, April 12, 1910, making this paper an attempt to supply additional information rather than a complete treatise on the subject.

The Fundamental Principles

To appreciate thoroughly the problems connected with an electrical installation some knowledge of the fundamental laws of electricity and a general acquaintance with the characteristics of various types of motors are necessary. Electrical power is measured by the product of volts, or pressure, and amperes, or current, expressed in watts; 1000 watts equals 1 kw. and 1 hp. equals 746 watts or approximately ¾ kw.

In every electric current conductor there is a loss causing a drop in voltage and heating the conductor. This drop is equal to the product of current and the resistance of the circuit. The heating is proportional to the power lost or to the product of the current flowing and the voltage drop, or the square of the current multiplied by the resistance. Large line drop means unsatisfactory operation, due to the voltage fluctuating with the load. With large amounts of power, small line drop and consequently satisfactory operation requires either large conductors or a very small current, which

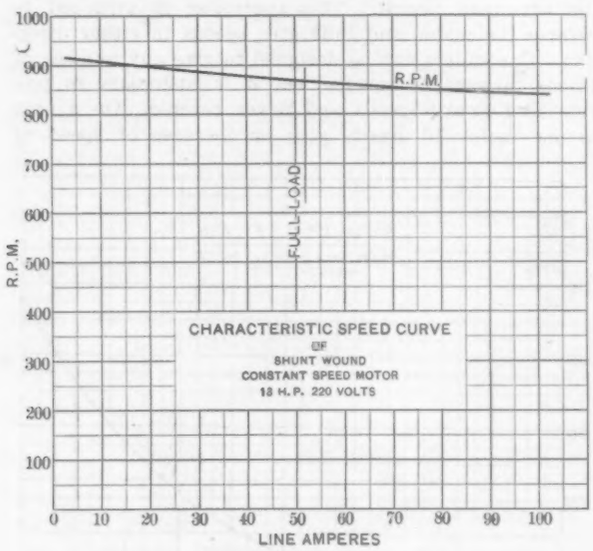


Fig. 1.

with a given amount of power requires a high voltage. This is more clearly shown by an illustration. To transmit 200 kw. to a point 1000 ft. distant, at 100 volts, with 5 per cent. line drop, requires 2000 amperes and 25,000 lb. of copper, while to transmit the same power the same distance at 500 volts, with the same per cent. drop in voltage, requires only 400 amperes and 1000 lb. of copper, the size of the conductor being limited solely by the drop in voltage. These proportions will not always hold true, as with a shorter line and larger current the limiting feature would be the heating of the conductor, so that both factors must always be taken into consideration.

Electric current is of two kinds, direct and alternating. Direct current generated at a certain voltage is

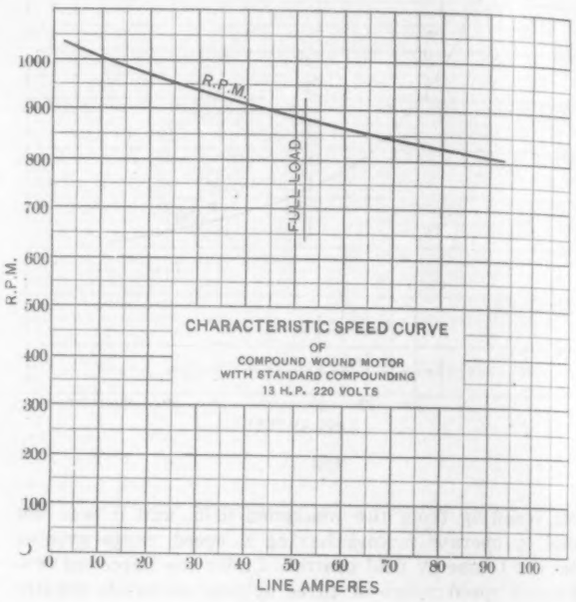


Fig. 2.

transmitted and used at that voltage. The voltage can be raised only by a motor generator set or by connecting two or more generators in series. Direct current voltages higher than 600 or 650, the standard for street railway work, are seldom used, although recent improvements in electrical machines have made it possible to use pressures as high as 1200 volts on railroad lines.

Alternating current, on the other hand, can be passed through transformers and the voltage either raised or lowered. Voltages as high as 750,000 are used for insulation testing. As transformers are comparatively inexpensive and highly efficient, alternating current is especially adapted to long distance transmission of power with low line losses.

The Various Classes of Electric Motors

The following briefly outlines the most striking characteristics of the various types of industrial motors: Direct current motors are classified with reference to the field coil windings, which determine the strength of the magnetic field on which the speed of the motor is dependent, as shunt, compound and series machines. The speed characteristics of motors having these windings are shown in Figs. 1, 2 and 3. Shunt wound motors are best where the load is readily started and there are no sudden overloads or extreme fluctuations in load. They have nearly a constant speed with change in load; compound wound motors are best for heavy starting duty, or where there are large overloads and sudden and great changes in load. Series wound motors are such as the standard crane and street railroad motors. The speed varies inversely as the load and the motors will stand great overloads without sparking at the commutators. By referring to Fig. 3 it will be noticed that the no-load speed is very high and the motors are likely to run away when the load is thrown off suddenly.

During the past two or three years the characteristics of direct current motors have been very materially changed by adding extra pole pieces and field windings. These are commonly known as auxiliary poles, and

* Read before the Metal Trades Superintendents' and Foremen's Club, Cleveland, Ohio, January 21, 1911.

† Assistant Manager of Works, Westinghouse Electric & Mfg. Company.

greatly improve commutation and enable a motor to carry large momentary overloads without sparking. More important, however, for machine shop service is that auxiliary pole motors will permit changes in speed by field control to a much greater extent than was possible previously. Without this additional winding, a motor's capacity is greatly reduced when it is speeded up by weakening its field. This is due to poor commuta-

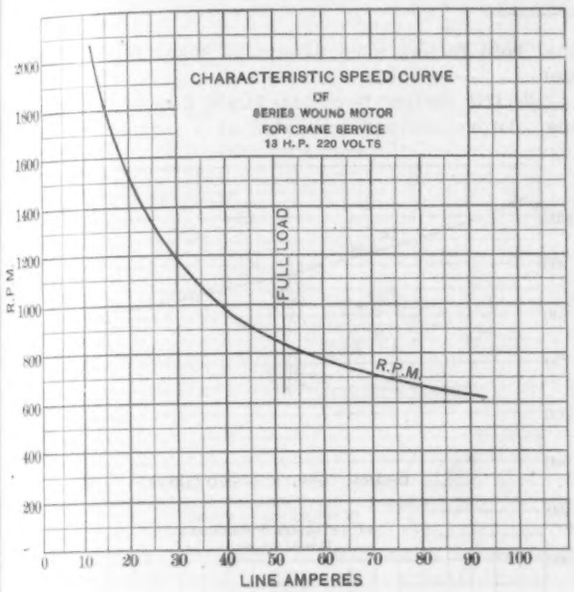


Fig. 3.

tion, resulting from the weakened field, and it was not usual to operate motors having a speed range greater than two to one by field control. Under the improved conditions a speed range of three or four to one is readily obtained, which makes such a motor ideal for machine shop use, where considerable speed variation is required.

Alternating current motors in ordinary service are divided into single phase and polyphase motors, the latter being subdivided into squirrel cage and wound rotor types. Single phase motors are particularly suitable where single phase lighting current is available and only a small amount of power at a constant speed is desired.

Squirrel cage motors correspond in characteristics to shunt wound direct current motors. They run at practically constant speed, the speed falling off very slightly with increasing load. They are not suitable for extremely heavy starting duty, but are the most perfect motors ever devised for light starting duty and where approximately constant speed is required because of their extreme mechanical simplicity and the absence of troublesome parts, such as commutators and brush holders.

Wound rotor induction motors are adapted for heavy starting duty, and can be run at any speed below normal with reduced efficiency by the introduction of resistance in the rotor winding. When this resistance is inserted the speed varies inversely as the load, and if a motor is running below speed, due to resistance in the rotor winding, the speed will come up to maximum as soon as the load is thrown off.

Polyphase alternating current is ordinarily two or three phase. To obtain the power in a two-phase circuit multiply the volts between the two wires of one phase by the current flowing, which gives the power in one phase, the total power being the sum of that in two phases. To obtain the power in a three-phase circuit, assuming all phases to be balanced, multiply the current in any wire by the voltage between any two wires and multiply this product by the square root of three.

Lighting, either arc or incandescent, is equally satisfactory with direct or alternating current. One hundred and ten volts is standard for incandescent lamps, but with direct current they can be run from higher voltage generators by means of comparatively cheap balancing sets, and on the three-wire system, which results in a great reduction in the amount of copper required. Although it is not so desirable, incandescent lamps can be connected in series so as to accommodate them to the voltage. With alternating current the voltage at the generator is of little consequence, as transformers are readily provided.

In installing electrical equipment it is important that the work be thoroughly first class, using the best material, and also to have the size, arrangement and division of circuits carefully worked out by a competent engineer. Poor wiring is a constant source of danger and expense, and poor arrangement or proportion of circuits makes an electrical installation unsatisfactory in operation. If lamps are operated on the same circuits with elevators and crane motors they will flicker, due to sudden throwing on and off of the loads.

For direct current motors for general shop use 110 or 120 volts is not generally used on account of the large current, requiring expensive wiring and controllers, and 500 volts cannot be handled comfortably and is objectionable as employees often get shocks. The commutators of 500-volt motors also require a little more attention than those of lower voltage, and are more apt to give trouble from sparking under overloads. Therefore, 220 to 240 volts become standard for general shop use and seems to answer all requirements very satisfactorily.

The choice of the kind of current and type of motors for any installation or application is important, as each installation has certain characteristics which make a certain kind of current or type of motor better than others.

The Use of Adjustable Speeds

In almost any machine shop it will be found profitable to drive many of the tools at varying speeds. It is not always convenient or possible to obtain the desired speed range by mechanical devices and retain the necessary quick operating features, so the adjustable speed motor has been developed. In its present form this motor is the outcome of many years of development and is a shunt wound, auxiliary pole motor. The speed adjustment is accomplished by introducing resistance in series with the shunt field by a controller, which also closes the armature circuit. This controller is arranged to reverse the motor and thus give speeds in either direction. Controllers can be designed to give any number of speeds forward or reverse, but it is customary to provide 16 forward speeds and fewer reverse. On a four to one motor 16 speeds give an increase of speed of

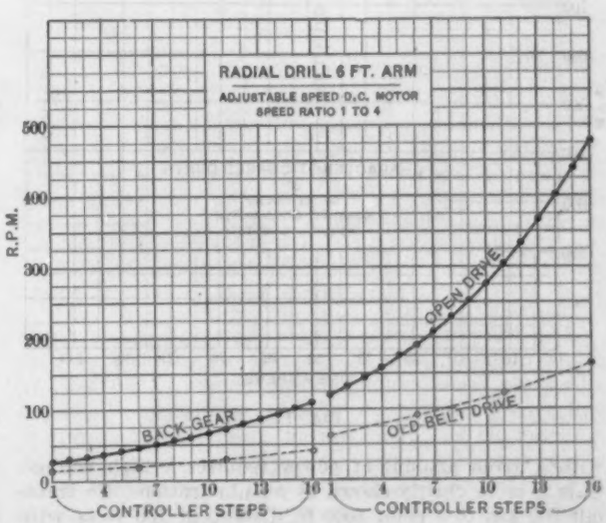


Fig. 4.

very nearly 10 per cent. for each notch on the controller.

In the earlier days motor speed could only be increased slightly by field adjustments without causing sparking at the commutator. Armature resistance was used to reduce the motor speed below normal. This was inefficient on account of the power lost in the resistance and also because the speed of a motor so controlled decreased with the load, which conditions are not allowable with varying or intermittent motor loads. The next and logical step was the introduction of the multiple voltage

system for supplying a number of voltages to the motor armature, the gaps between voltage being filled by field adjustment speeds, and a very wide range could be covered with an unlimited number of controller notches. In two machine shops with which I am familiar, a four-wire multiple voltage system is in use, where a speed range of about nine to one is obtained on the motors with 42 controller notches. This gives an increase of approximately 3 per cent. for each speed over the previous one. Such a speed range results in an excessively large motor and an unnecessary refinement in speed adjustment, as well as an expensive controller. For some years the multiple voltage system filled a long felt want, but it was not ideal. The balance sets and the complications and extra cost of shop wiring were objectionable, and the present adjustable speed motor is a natural result of necessity.

In any system of speed adjustment the ideal is attained when the speed can be increased by constant percentage increments. This is known as geometric progression as distinguished from arithmetic progression in which each increment is equal to the preceding one. It is generally conceded that 10 per cent. increments are satisfactory, and when these are increased to 15 or 20 per cent. production is restricted, and time and money wasted because tools cannot be operated at the most efficient speeds. Any discussion of correct and efficient operating speeds presupposes an organization and system

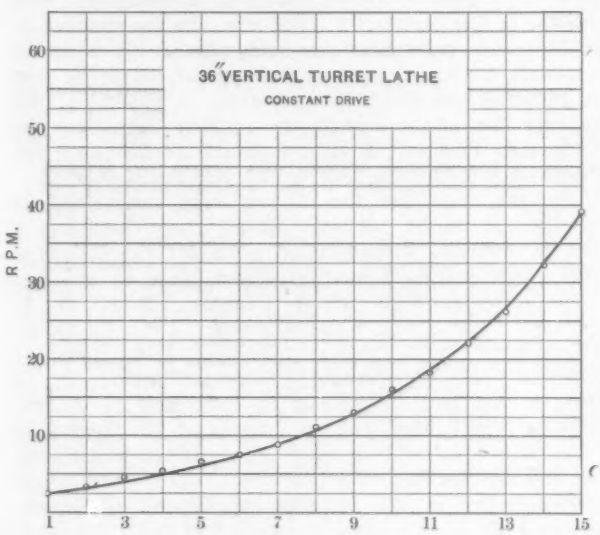


Fig. 5.

which will obtain the maximum output from operators. One of the greatest obstacles has been removed now that an operator can reach without changing his position a simple lever by which he can control the cutting speed of his machine throughout a considerable range by increments of 10 per cent.

Motor-Driven Tools

Fig. 4 shows a graphic speed chart of a standard belt driven radial drill and of the same tool equipped with an adjustable speed motor and one change in gearing. It will be noticed that only eight speeds are obtainable with the old belt drive, having one change of gears and a four-step cone pulley. This drill is one of probably 25 or 30 in one shop, all used on a varied class of work, consisting of drilling, counterboring and tapping various sized holes. Several of these drills have been converted to motor drive with a marked increase in output. The increased output depends upon the class of work, as there would be no increase if the same sized holes were being drilled at all times, provided the proper speed could be obtained for that hole. In this case the work was constantly changing, and workmen rarely shifted the belt on the cone pulley and only changed the back gears. Nevertheless the shop was considered progressive and used a modern system of wage payment which was supposed to secure maximum output from the men. Little time would probably be saved by shifting the belt to change the speed, as this is a slow process and the workmen avoid it whenever possible.

With the motor drive and the back gears arranged to be changed quickly the operator can readily be introduced to work at the most advantageous speed. The men are enthusiastic about the change in drive and willingly accept a cut of three hours on a 10-hour job, which a careful study of conditions shows to be a very moderate estimate of the saving. If we assume earnings of 30 cents per hour and an overhead of 100 per cent., a man will do work in one day on the altered tool for $3, or a factory cost of $6, which formerly cost 40 per cent. more, thus making a saving of $2.40 per day. This saving will pay for the tool in a short time, and does not have one wondering just what percentage of the investment must be saved per year to justify the expense. It is needless to point out how important it usually is to increase the output of a given equipment without requiring additional floor space and mechanics.

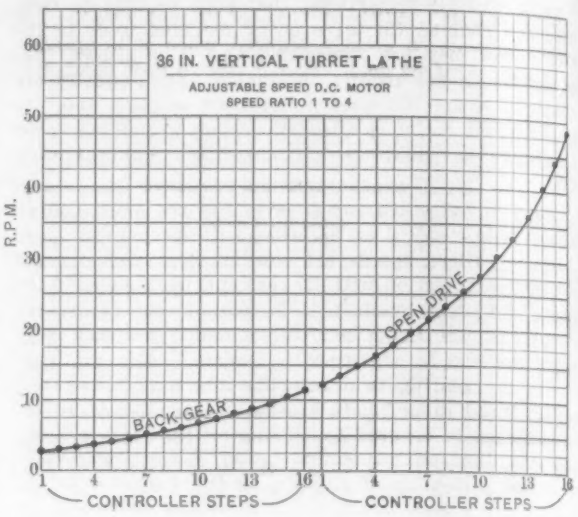


Fig. 6.

I have dwelt on this drill press case for several reasons. The tool is universally used, and, in my opinion, is not given the attention it deserves in many shops. Also the statements made regarding the advantages of applying motor drive to it apply to almost every tool where a variety of work is turned out. I have frequently heard the statement made that it does not pay to apply motor drives to old tools. I believe that the example given fully proves the contrary, especially when you consider that the motor and controller can readily be applied elsewhere when the old tool goes to the scrap heap.

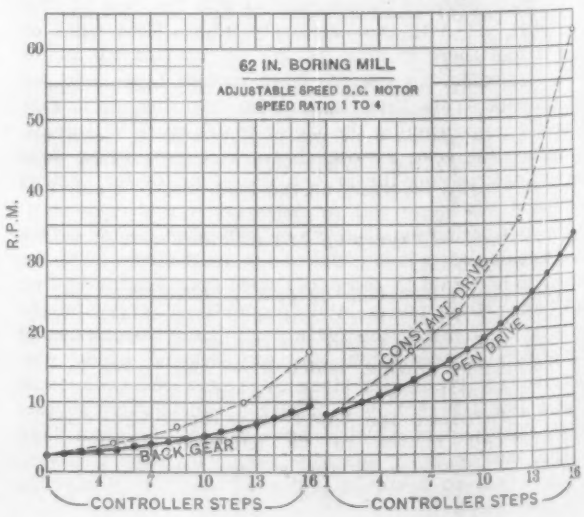


Fig. 7.

Records of lathes, drill presses and boring mills, notes upon charts of the correct running speeds for all classes of work regularly done on each tool and a consideration

of the time and manual labor required to make the changes in speed would be a revelation to many, and emphasize the desirability of adjustable speed motors. I would strongly recommend that such records be compiled and charted for all existing machine tools in the shop unless they are specialized and it is known that correct speeds are readily obtainable. It is equally advisable to secure the same information on tools about to be purchased, for it is often surprising to note the poor assortment of speeds which some tool manufacturers offer.

Fig. 5 shows speed curves of one of the most modern tools, a 36-in. vertical turret lathe, with mechanical speed changes. Fifteen speeds are obtainable in almost exact geometric progression with 20 per cent. increments. Such results are exceptional, and the manufacturers deserve great credit, yet 20 per cent. increments are rather large where the highest efficiency is desired. Also the friction in the gearing is of considerable importance, and greater speed range, more speeds and smaller speed increments can be secured by leaving off the extra gearing and installing an adjustable speed motor. This will mean but a very small addition to the first cost of the tool.

Fig. 6 shows a chart of a 62-in. vertical boring mill. This mill has not been changed to motor drive, but the chart shows how desirable that would be. When belt driven the speeds overlap, so that in reality only eight speeds are obtainable, and of them at least one is higher than can be used. It is needless to point out what a saving a motor would be on this tool. The point I wish to impress, however, is that such tools are not the exceptions but the rule in the average shop.

Fig. 7 shows the chart of a modern heavy duty radial drill press. It is interesting in several respects. The motor is rated at 12½ hp. at 400 to 1600 rev. per min. Spindle speeds from 30 to 120 rev. per min. are obtained with back gears in and 125 to 500 rev. per min. with gears out—32 speeds altogether. A competitive drill test was recently conducted on this machine, grading the drills in three ways, according to the inches of both steel and iron they would drill without distress, the same when run to destruction, and the horsepower required to drive each drill under all conditions determined by a recording meter. Naturally the drills which required the least power gave the longest life. There was a very appreciable difference in this power and the readings with different drills of the same manufacturer were consistent.

In these tests the 12½-hp. motor was frequently run up to 35 hp., or nearly 200 per cent. overload. While it is not recommended that motors be run for long at such overloads, yet with the extremely intermittent work on such a tool there is little danger of injuring the motor with overloads. In general when motors have been put on machine tools they have been too liberal in size. Properly proportioning the motor to the work will greatly reduce the cost, and much work is now being done toward determining the proper size of motor for various classes of work.

In considering small group or individual motor drives in a machine shop it is usual to lay great stress upon the power to be saved as compared with long lengths of line shafting. While power, and frequently a large amount of it, is thus saved, the feature of prime importance is the effect on production, and any scheme which will increase the output of a given equipment and floor space even a few per cent. will justify a considerable investment. The papers which I have referred to show that electric motors in the machine shop will make a saving which leaves no doubt as to the advisability of making the investment.

H. W. Hendrickson, Park Building, Pittsburgh, manufacturers' sales representative, has arranged with the Wetzel Mechanical Stoker Company, Trenton, N. J., to represent it in certain sections of Ohio, Pennsylvania and West Virginia. Mr. Hendrickson also represents the Riblet Heater Company, Erie, Pa., manufacturer of the transverse current feed water heaters. Recent Pittsburgh contracts include the following: People's Natural Gas Company, 400 hp.; Joseph Horne Company, 600 hp.; Allegheny General Hospital, 1000 hp.; Lewis Building, 600 hp., and the Jenkins Arcade, two 500 hp.

Rogers, Brown & Co.'s Thirtieth Anniversary

On January 17 to 19 Rogers, Brown & Co., the widely known pig iron firm, held in Cincinnati a meeting of its members, resident managers and other representatives to commemorate the thirtieth anniversary of the founding of the house. It was the fourth meeting of this character that the company has held, and was by far the largest, most representative and most enthusiastic. Marking the closing of 30 years of successful business, it was in many ways an event of unusual interest.

On the first day the partners held their annual meeting. On the second day the resident managers and salesmen from the branch offices arrived, and at noon the company, numbering 43, dined at the Queen City Club. The afternoon was spent in general business discussion and the delivering of addresses as follows: "Welcome," W. A. Rogers; "Northern Iron," Harwood Wilson; "Southern and Virginia Iron," F. W. Miller; "Eastern Iron," N. H. Swayne, 2d; "Lake Superior Iron," F. I. Foote; "Information," C. A. Stillman; "Settlement of Complaints," J. C. Mears. In the evening D. B. Meacham entertained the company at his home in Avondale, for the mutual interchange of ideas. It was an informal and delightful gathering. A number of the younger men of the organization, calling themselves the "Pig Iron Pushers," gave a dramatic performance for the balance of the assembly, which was much enjoyed.

On the third day the visitors were entertained at luncheon at the St. Nicholas Hotel, where there was a further informal discussion of plans for the following year. The addresses that afternoon were as follows: "Our Raw Material," W. A. Rogers; "Coke," W. P. Cheney; "Alloys and Foreign Trade," J. C. Claussen; "Fluorspar," W. A. Moore; "Credits," J. R. Houston; "Buyers," H. W. Fernald; "Transportation," F. C. Wright. On both afternoons the addresses in general were of high caliber, but the address of Mr. Rogers on "Our Raw Material," in which he explained to all present the far-reaching extent of the ore properties which are controlled by the furnaces represented by Rogers, Brown & Co. gave a splendid inspiration to all the salesmen and demonstrated that no effort is being overlooked to make stronger the first position occupied by this company in the iron world. Another talk which was of much importance was that on fluorspar. This company has recently become the largest dealer in fluorspar in that material in this country, representing the large deposits in southern Illinois, which in a short time will be equipped with the most complete plant ever known for the handling of this material, which is so largely used in the metal trade.

Those present during the three days were as follows: Wm. A. Rogers and W. T. Shepard, Buffalo, N. Y.; M. C. Armour and E. L. Billingslea, Chicago; D. B. Meacham and J. K. Pollock, Cincinnati; A. A. Fowler, New York; N. H. Swayne, 2d, Philadelphia; H. W. Fernald, Boston; S. W. Hubbard, Cleveland; Harwood Wilson, Cleveland; J. C. Mears, St. Louis; J. R. Darragh, Pittsburgh; W. P. Cheney, Pittsburgh; C. A. Stillman, Chicago; C. P. Mercer, Birmingham; F. I. Foote, Chicago; F. C. Wright, Cincinnati; J. R. Houston, Cincinnati; F. W. Miller, Cincinnati; W. A. Moore, Rosiclare; R. T. Melville, Buffalo; H. B. B. Yergason, Cincinnati; J. C. Claussen, New York; William Sampson, Cincinnati; G. R. Sullivan, Philadelphia; H. E. Turner, Cincinnati; L. G. Calkins, Chicago; Douglas Bissell, Buffalo; R. W. Clark, New York; F. W. Bauer, Cincinnati; C. A. Wyatt, Boston; W. H. Knight, Cincinnati; F. E. Fitts, Jr., Boston; Wm. S. Rogers, Buffalo; A. O. Sonne, Chicago; F. J. Waldo, Buffalo; A. J. Wentworth, Cincinnati; H. W. Frister, New York; R. D. Meacham, Cincinnati; C. E. Bertie, Philadelphia; A. O. Galloway, Cincinnati; G. M. Butler, Chicago.

An Electrically Driven Brass Mill

Details of the Installation at the Plume & Atwood Mfg. Company's Plant

In 1900 the Plume & Atwood Mfg. Company, Thomaston, Conn., manufacturer of brass wire, rods and sheets, equipped a portion of its plant with the electric motor drive. At that time, a 200-kw. two-phase generator was installed to supply power to various tools in the machine shop and replaced the engine drive previously employed, the immediate cause of the change being the distance to which the engine had to transmit power through belting and line shafts. The greatest advantage of the electric drive in machine shops, namely, the use of adjustable speed direct current motors on individual tools, was not obtained, as only a few large constant speed alternating current motors were installed to drive the line shafts. The service, nevertheless, was satisfactory, and the drive was gradually extended by adding motors here and there in the various rooms, although the power for the main rolls was still supplied by a large steam engine in the floor of the main shop, the steam supply being piped from the boiler plant, which was located in a separate building. In 1907 it was decided to use electric power throughout the plant and the engine drive was entirely discarded. Since that date the application of the principles of the electric motor drive has been extended until at present the plant is believed to be the most complete electrically driven brass mill in the United States.

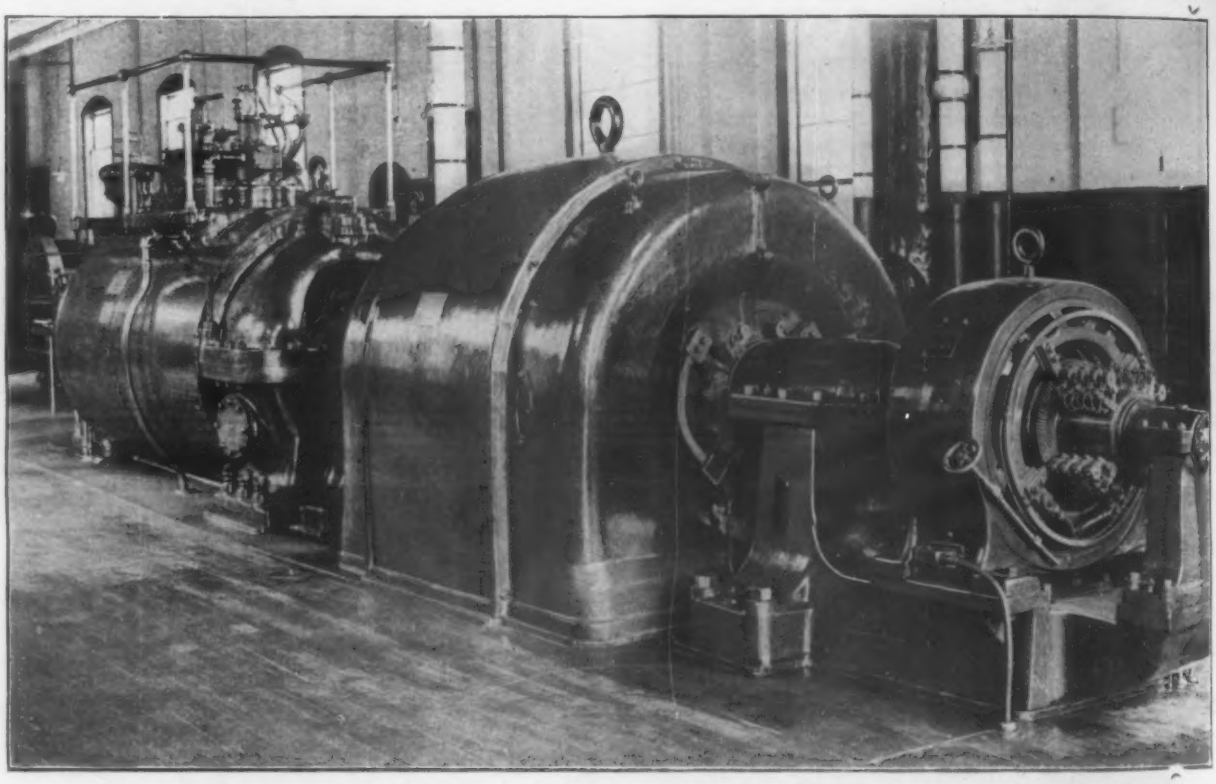


Fig. 1.—The Westinghouse 750-Kw. Steam Turbo-Generator Set Installed in the Brass Mill of the Plume & Atwood Mfg. Company, Thomaston, Conn.

When the change was made a 750-kw. Westinghouse steam turbo-generating set was installed in the main power house, together with the original 200-kw. generator. A view of this new set, together with the necessary auxiliary apparatus, is given in Fig. 1. Various sizes of motors made by the Westinghouse Electric & Mfg. Company, Pittsburgh, Pa., who also furnished all the other electrical equipment, were installed in the shop to drive the different rolls, some being placed in pits below the floor and others on the floor. The motors were geared to the countershaft driving the rolls in some cases and in others silent running chains were employed to transmit the power. These additional motors brought the total capacity of the installation up to 1300 hp., the individual capacities of the 22 motors ranging from 5 to 150 hp.

The service record of the turbine is especially interesting. It was put in commission in October, 1907, and the case was not opened until a year later. An inspection was then made of the blades, but no repairs of any sort were made, and at present the turbine is running 10 hours per day and six days a week. Prior to the opening of the turbine case in 1908, no trouble was experienced and the only reason for making the inspection was a desire to see whether any wear had taken place, but no appreciable signs of wear could be found.

One of the immediate results of electrifying the plant was a material increase in its capacity, owing to the speeding up of the rolls. At the time the change was made the speeds of the rolls were increased from 15 to 100 per cent., the average being 40 per cent. Considerable overtime work which had previously been found unavoidable was eliminated by the change, and in addition considerable floor space was rendered available in the shop due to the removal of the main engine, while rearrangements and additions have made further economies possible. In changing over from the engine to the motor drive, no interruption of any sort was caused to the rolling service, and the men were able to work through the changes, with the result that the production of the mill was not even temporarily decreased.

As a general thing a single motor drives two rolls, but the three through which the first passes are made are driven by a single countershaft which derives its power from two motors, one of 100 hp. and the other of 150 hp. Both of these are the standard Westinghouse type CCL squirrel cage induction motors and are connected to the countershaft by silent running chains, thus operating in parallel not only electrically, but also mechanically. The 150-hp. motor is shown in Fig. 2, with its chain connection to the pinion countershaft, and the chain connecting the other motor can also be seen, although the motor itself is hidden. This engraving illustrates very clearly the flexibility of the electric motor drive, as although 250 hp. was required, a motor of this size could not be installed in the pit without tearing out a portion of the foundation. It was found more satisfactory to use two motors having as their total the required horsepower and located on opposite sides of the pinion countershaft, an arrangement which materially reduced the strain on the countershaft bearings. In another location at the plant where 175 hp. was required for driving another set of rolls, two motors were connected by chains to the same pinion coun-

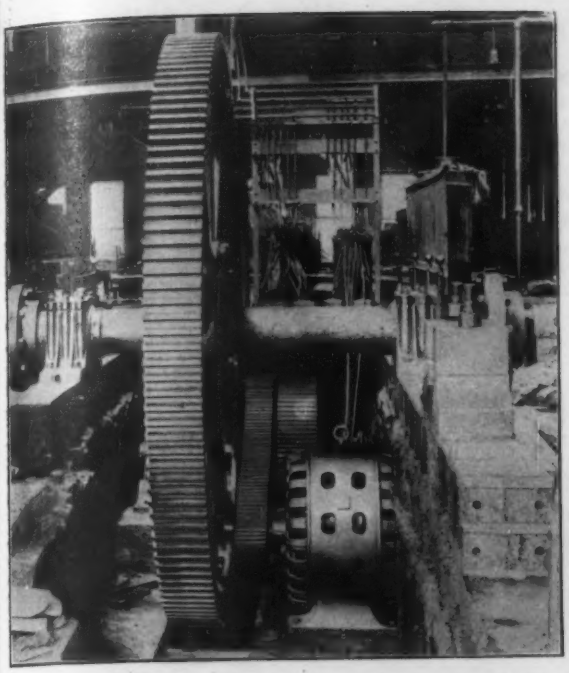


Fig. 2.—The Countershaft Driving the Three Rolls Through Which the First Pass Is Made and One of the Motors Furnishing Power to It.

tershaft. In both these cases a flywheel was used to smooth out the sudden demand for power due to material entering the rolls. Without a flywheel the sudden application of the load would take the slack out of the chain with a snap sufficiently violent as to run the risk of breaking the chain or at least throwing it off the sprocket. The flywheel acts as a cushion and the load is taken very easily and quietly with only a few slight undulations of the chain.

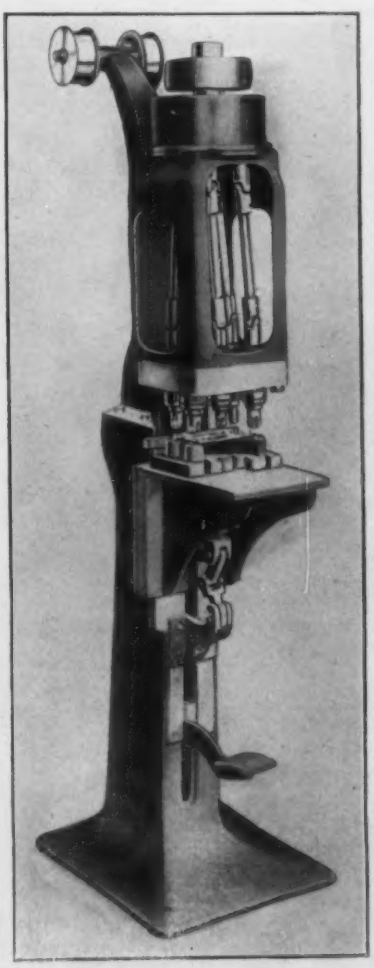
The installation of the motor drive on the rolls has brought about economies not only in money but also in time. Formerly when the work jammed in the rolls the latter broke and had to be replaced, which cost money and also required time. With the electric motor drive the fuse blows out and cuts off the current from the motor, thus stopping the rolls. During the three years that the rolls have been motor driven, there has been no expense for renewing broken rolls and the total maintenance charge on this particular portion of the roll and motor equipment is said to have been less than $25. The speeding up of the rolls as a result of the use of motor drive increased their capacity above that of the overhauling machines and necessitated overtime work at different times. These machines were driven by a 20-hp. motor and to obviate the necessity of running the large turbo-generator to supply it with power, a direct current motor was installed nearby so that the belt from the alternating current motor could be readily shifted to it. Direct current for this motor is supplied from a small steam engine driven generator that was previously used as the exciter for the original 200-kw. generator.

New Railroad Equipment.—The Central Railroad of New Jersey is reported to be in the market for 250 refrigerator cars and the Central of Georgia for 300 freight cars. The Great Northern ordered 100 additional freight cars and the Illinois Central will build 100 all wood logging cars at its shops. The Norfolk & Western has awarded the building of 700 steel underframe cars to the Virginia Bridge Company, and will build 700 in its own shops. The Philadelphia & Reading will build 23 passenger locomotives at its Reading, Pa., shop. The Grand Trunk Pacific is reported to have ordered 12 locomotives, and the Illinois Central is preparing specifications for 45. The Boston & Albany has closed with the American Locomotive Company for 10 passenger engines.

Mattie Furnace of the Girard Iron Company, Girard, Ohio, was blown in last week after being relined and extensively repaired.

The Grant Multiple Spindle Rivet Spinner

The Grant Mfg. & Machine Company, Bridgeport, Conn., has recently brought out a special five-spindle, noiseless rotating roll rivet spinning machine. It was particularly designed for riveting five posts into clock frames or plates, but is readily adapted to a great variety of work where the holes are not too close to permit spindles of sufficient size and strength to be used. This new machine differs very materially from the company's regular line of single spindle rivet spinners, one of which was illustrated in *The Iron Age* September 16, 1909.



A Multiple Spindle Rivet Spinner with Rotating Rolls Made by the Grant Mfg. & Machine Company, Bridgeport, Conn.

Among the points of difference to be noticed are that the table moves up and down, thus bringing the work in contact with the spinning rolls by an arrangement of toggles. The spindles have individual vertical adjustment for accommodating various hights of work, and are revolved from one common pulley in practically the same way as the drill spindles in a multiple spindle drill press. The spiral gears driving the spindles are inclosed in a cast iron case and are partly immersed in oil. While these gears are in motion a pumping action takes place which draws oil from the bottom of the gear case up and around the sleeve gear bearing. Centrifugal force throws the oil out at the top of the gears and gravity returns it to the bottom of the gear case, an arrangement which lubricates the upper working parts thoroughly.

The roll holders and the lower part of the spindles are mounted in a solid casting attached to the main frame of the machine. The location of the spindles in this casting matches exactly the location of the posts to be riveted, as it is intended to use a number of these spindle rotating plates or castings to accommodate work of different shapes and varying center distances. All of these plates are interchangeable with the frame, and can be quickly removed and replaced by others, as the lower part of the universal joint connecting the upper and the lower parts of the spindle has a square hole in it that matches the short spindle attached to the plate casting. This arrangement permits the casting to be removed and another plate and set of spindles inserted that will exactly match the work for which it is intended without adjustment in a very few minutes.

J. C. Maloney, manufacturers' agent, Swissvale, Pittsburgh, Pa., has secured the agency for the Blume & Blume diamond mesh woven wire fence machines and is now prepared to furnish the trade.

The Reed Heavy Duty Engine Lathes

A New Line of Tools Particularly Intended for Railroad Work

Several new heavy duty engine lathes are being put on the market by the F. E. Reed Company, Worcester, Mass. These tools are specially designed for use in railroad shops and for handling other classes of heavy work. At the present time the lathes are built with swings of 18, 20, 22 and 24 in., and the company is making preparations to add a 27-in. and a 30-in. size. Fig. 1 shows the 24-in. lathe and Fig. 2 the tool having an 18-in. swing.

The headstocks are of massive proportions. All the sizes have double back gears and the three smaller ones are equipped with a three-step cone pulley, while the 24-in. and the two proposed additional sizes have one more step. All of the tools are made proportionately heavy throughout to correspond with the increased swing. The apron feed mechanism is driven by a worm and worm gear and the cross and longitudinal feeds by double frictions. All of the tools are equipped with a quick change mechanism, giving 60 changes for both the lead screw and the feed rod, and the arrangement is such that both the rod and the screw cannot run at the same time. All the gears in the front case are of steel, with a coarse pitch. A thread cutting index is furnished for the lead screw. For transmitting power to these tools a two-speed friction countershaft with large pulleys and self-oiling bearings is used.

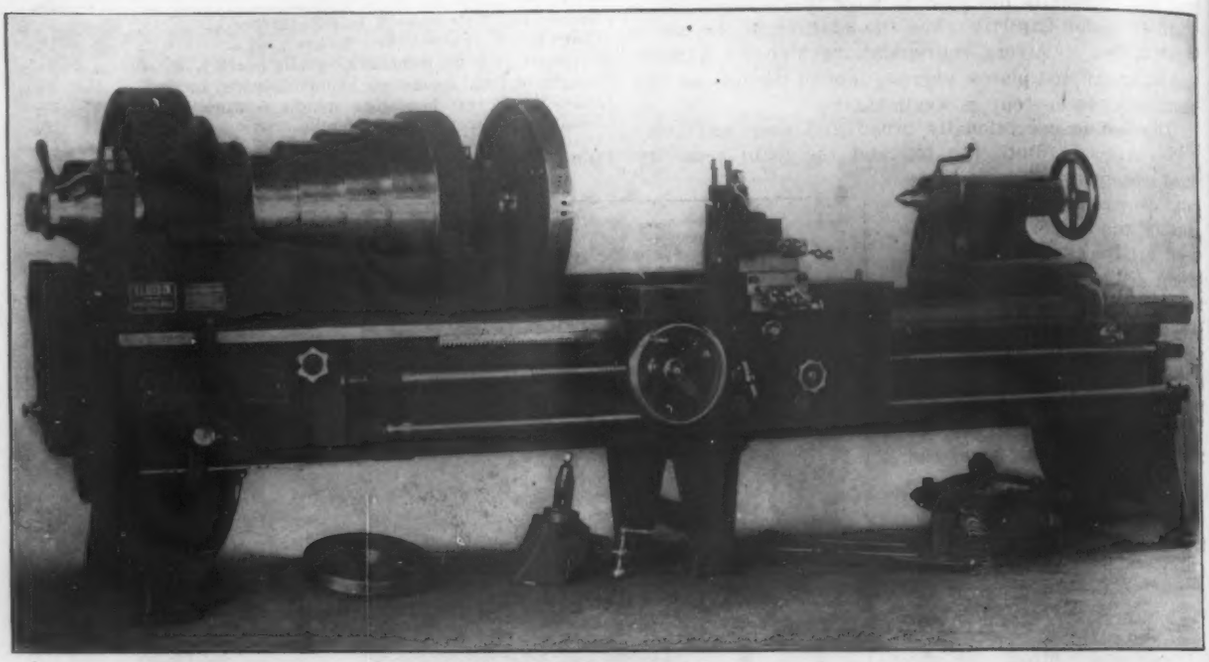


Fig. 1.—The 24-In. Lathe.

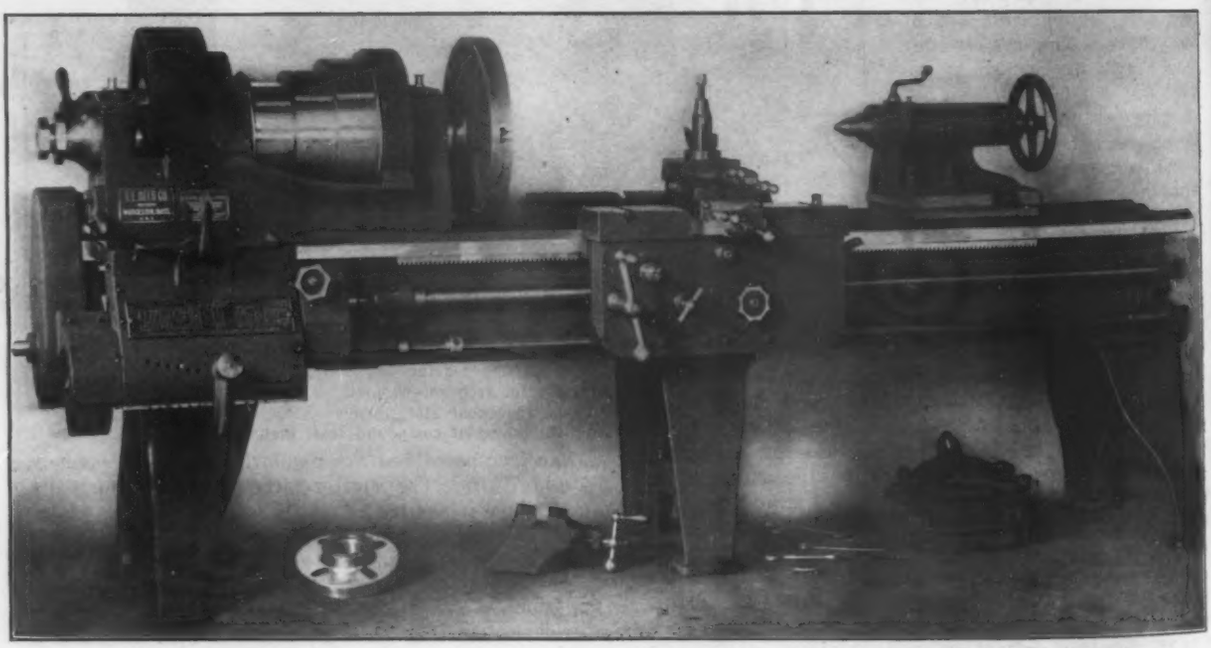


Fig. 2.—The 18-In. Lathe.

Two of the New Double Back Geared Lathes with Quick Change Gear Box Built by the F. E. Reed Company, Worcester, Mass.

The Scott Madden Iron Works Company, St. Louis, Mo., has purchased a large manufacturing plant at Marion, Ind., which it will remodel for its special purpose. Completion is expected June 1, at which time the company will combine its entire manufacturing force at Keokuk, Iowa, and Rushville, Ind., also the St. Louis office. It has taken over the manufacture of the Kersey power excavator, formerly manufactured by Francis E. Kersey, Lebanon, Ind.

The Barnes Motor Driven Gap Lathe

A Small and Convenient Tool with All Parts Self-Contained

A self-contained motor drive has been applied by the Barnes Drill Company, 814 Chestnut street, Rockford, Ill., to its 12-22-in. sliding extension gap lathe. This tool was originally designed to meet the demand for a small extension gap lathe, and the addition of the motor drive makes it a very convenient machine for garages and other isolated places where, although there is no line shaft, electric current is available.

The bed is exceptionally broad and deep and thoroughly braced. Both the top and the main beds are fitted closely together by dovetail construction, thus permitting the upper one to be held firmly at any point by clamp bolts extending transversely through the main bed. When it is desired to increase the gap the screw and crank at the rear end draw the top bed back. The rack and pinion controlling the movement of this bed are cut from steel and the former is in one piece.

The headstock is of heavy and strong construction and the spindle is of high grade machinery steel. It runs in amply proportioned bronze bearings that are carefully scraped and fitted. Eight changes of spindle speed are available by a four-step, wide face cone pulley and set of back gears. The cone pulley can be instantly locked to the spindle by a push pin. An offset type of tailstock is employed which permits the compound rest to be set parallel with the bed. A setover adjustment for use when turning tapers is also furnished.

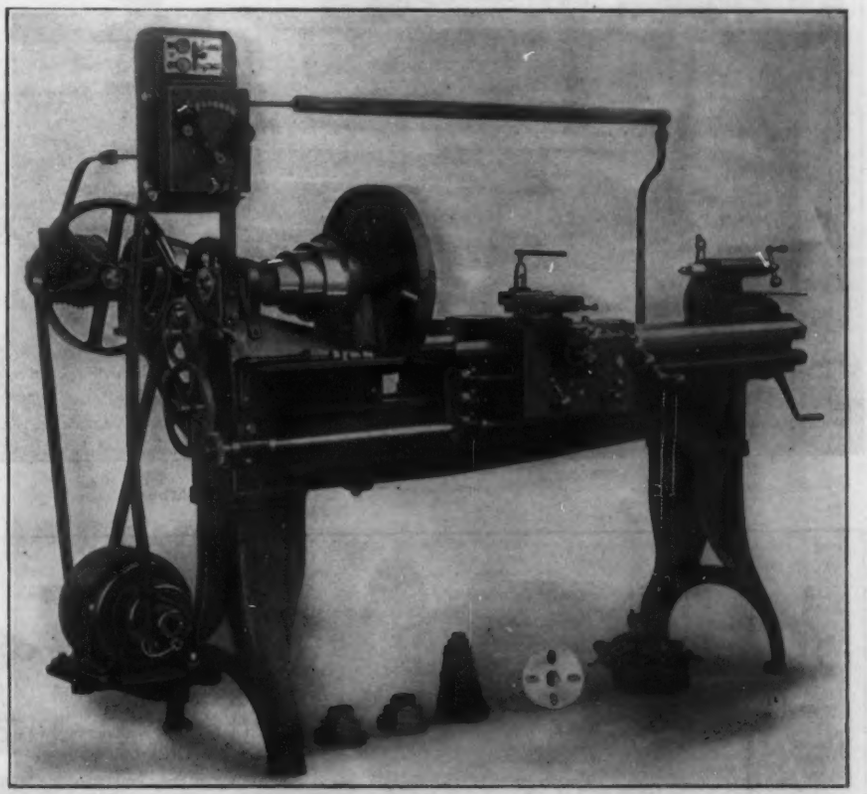
The carriage is extended in front and has sufficient strength to support the turning tool firmly when doing work in the gap. It is fed by a splined screw, and has a long V bearing on the front way of the bed and a flat one at the rear. There are a number of gibs for taking up wear, and if desired the carriage can be clamped to the bed for cross feed work. T slots for clamping work on the carriage are also provided. The compound rest has a graduated base and sufficient travel to take care of the maximum capacity of the lathe.

Both the cross and the longitudinal feeds are of the power type, and the necessary change gears for cutting either right or left hand threads for all numbers from 2 to 18, including an 11½ pipe thread; every even thread from 18 to 36, and every fourth thread from 36 to 48, are furnished.

Any standard alternating or direct current constant speed motor can be used for driving the lathe, and when so equipped eight changes of spindle speed are available. The motor is belted to the driving shaft pulley, and the friction clutches for changing the direction of rotation are mounted on this shaft. These clutches are of the same type as the ones used in the maker's all-geared tapping machine, which was illustrated in *The Iron Age* June 30, 1910. From the driving cone pulley mounted on this shaft a 2-in. belt transmits the power to the spindle cone pulley. The horizontal shifting bar above the lathe within convenient reach of the operator controls the starting, stopping and reversing of the spindle. Moving the bar to the left gives the forward motion, to the right the reverse and in the central position the motor is stopped. The ratio between the forward and the reverse speeds is 1¼ to 1.

The following table gives the principal dimensions and specifications of the lathe:

Swing over bed, inches	13
Swing over carriage, inches	8½
Swing in gap, inches	22½
Diameter of largest cone pulley step, inches	7½
Diameter of smallest cone pulley step, inches	3¼
Width of cone pulley steps, inches	2¼
Diameter of hole through spindle, inches	1 1/32
Diameter of spindle nose, inches	1¾
Diameter of front headstock spindle bearing, inches	2 1/16
Length of front headstock spindle bearing, inches	3 7/16
Diameter of rear headstock spindle bearing, inches	1½
Length of rear headstock spindle bearing, inches	2¾
Diameter of tailstock spindle, inches	1⅛
Morse taper of tailstock spindle	No. 3
Morse taper of headstock spindle	No. 4
Ratio of back gearing	8 to 1
Diameter of feed screw, inch	1
Size of tool post slot, inches	½ x 1
Angular travel of compound rest, inches	3



The 12-22-In. Gap Lathe with Motor Drive Built by the Barnes Drill Company, Rockford, Ill.

The lengths of bed are regularly furnished—namely, 5½ and 7½ ft. The shorter lathe has a minimum distance between centers of 36 in. and a gap of 18 in., while the maximum distance between centers on the other type is 96 in. and the gap is 36 in.

The equipment furnished with this lathe includes change gears and the other accessories ordinarily supplied. The starting rheostat, which is also included, is conveniently mounted on a bracket, and the tool is supplied with belts, completely wired and ready to run as soon as the feed wires are connected.

The Bollinger-Andrews Construction Company, Pittsburgh, has completed an extension, 140 x 150 ft., to the foundry department of its plant at Verona, Pa., giving the foundry a total length of 610 ft. The plant is being operated on gray iron castings, chiefly ingot molds and furnace castings.

The Pacific Coast Steel Company has completed the installation of machinery at its new plant in South San Francisco, including an 8-in. and a 10-in. rolling mill. Two 30-ton open hearth furnaces are to be completed in time for the plant to start in April.

Forging with a High Speed Hydraulic Press

It has been possible for some time both in this country and abroad to make large forgings with a hydraulic press, but it is only lately that it has been possible to

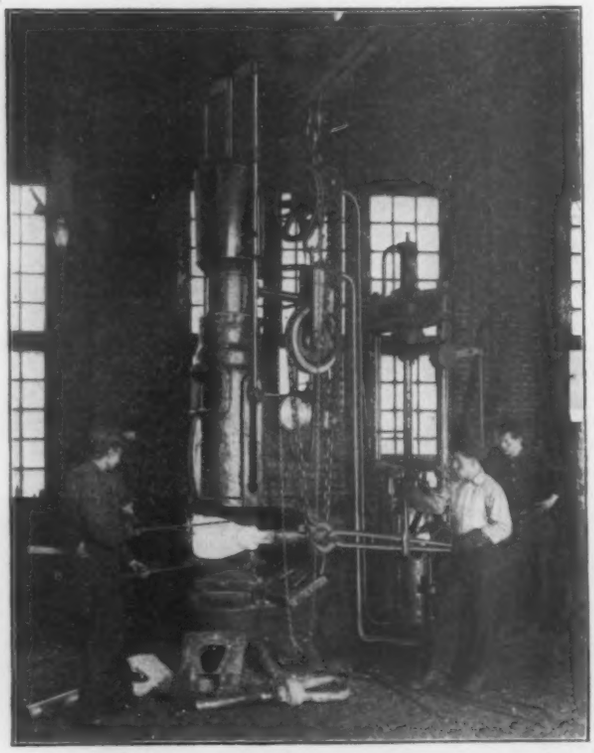


Fig. 1.—The 150-Ton High Speed Hydraulic Forging Press Made by the United Engineering & Foundry Company, Pittsburgh, Pa.

utilize a press of this type for smaller forgings. The larger type of hydraulic presses equipped with the Davy single lever control and manufactured in this country by the United Engineering & Foundry Company, Farmers'

Fig. 2.—Forging Shackles with Unskilled Labor in India on a Hydraulic Press.

Bank Building, Pittsburgh, Pa., were illustrated in *The Iron Age* June 30, 1910. Figs. 1 and 2 show two 150-ton presses of this company in operation under widely differing conditions, and Fig. 3 illustrates a typical forging made with one of these presses.

Fig. 1 shows the machine in operation in America and illustrates how simple tools can be used under the press to help on certain jobs. One of these is the tapered wedges used to form the sides of the eyebolt being forged. These wedges are said to work very satisfactorily without placing the crew in danger.

An installation of one of these presses in India is shown in Fig. 2, and the ease with which forgings can be made and the absence of flying scale or sparks are clearly illustrated. This is one point in favor of the forging press as compared with a hammer, as it would be impossible for people dressed as the Indian natives do to work at a hammer. The practice employed in making shackles differs from that generally employed in this

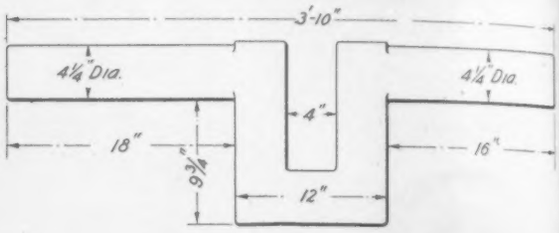


Fig. 3.—A Crank Shaft Forged by One of These Presses from a Solid Piece.

ccountry. In forging shackles on the press illustrated, a billet of sufficient size to form the head without upsetting is used. In this way a superior forging is said to be obtained because of the amount of working the steel receives, while at the same time the work is turned out quickly, as the press is able to make a large reduction in the size of the billet at each stroke.

The use of the single lever control on these presses is said to make it possible to do a great variety of work that cannot be handled by a hammer. The crank shaft shown in Fig. 3 was made from a billet measuring 14 x 4½ x 21 in. in a 150-ton press without the use of any special tools, in 19 min. with one heat. This time included the slotting out between the cheeks and the saving due to not having any slotting or drilling to do afterward is apparent. This time was made on the first of a lot by a crew that had not had any previous experience on this particular class of work.

Super-Vitrite High Speed Steel.—Howell & Co., Ltd., Wincobank, Sheffield, England, is calling attention to a fine performance of its Super-Vitrite high speed steel in turning a shaft in its own shops. A rolling mill shaft had been broken, and it was essential that it should be repaired at the earliest possible moment. A rough forged steel shaft of 0.40 carbon, weighing 4928 lb., was obtained and turned down to the necessary dimensions. It was at first attempted to turn the shaft at 68 ft. per minute, but so much sand had been forged into the skin of the material that this was found to be impossible, the cut sparking like a dry emery wheel. The speed was then reduced to 50 ft. per minute, and kept until the turning was finished. The finished weight of the shaft was 3248 lb., so that 1680 lb. was turned off. The time taken was 29 hours, of which 13 was roughing and 16 finishing. During the roughing the material removed amounted to nearly 112 lb. per hour. The roughing cut was eight cuts to the inch, and the depth varied from ¼ to ½ in. The performance would have been greatly improved if it had not been for the sand in the skin of the material. The tool was only ground twice in the progress of the work.

The J. W. Gore Company has changed its name to Southern Tool & Supply Company, and removed from 3 Boyce street to 5 East Main street, Chattanooga, Tenn. The company now has much more commodious quarters, has increased its capital and is prepared to handle a very much larger business than heretofore in machine tools, planing mill and pattern shop machinery and machinists' supplies.

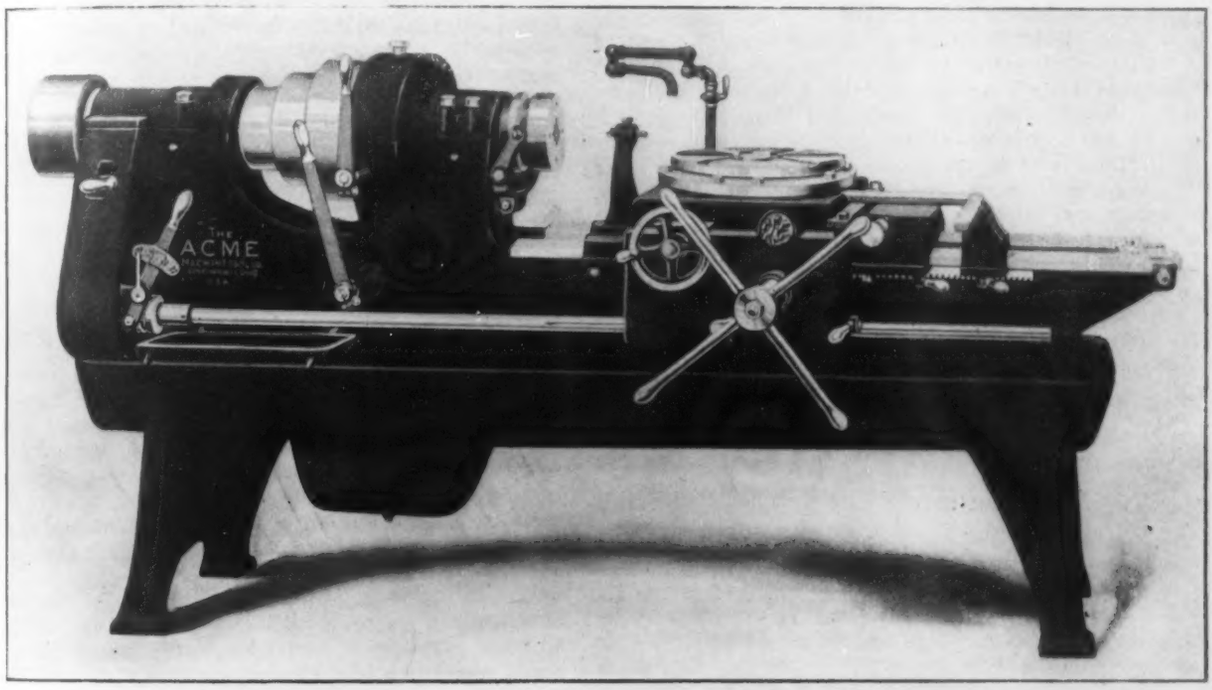
The Acme Combination Turret Lathe

A new type of turret lathe capable of handling a wide range of bar stock work and also forgings and castings has recently been designed by the Acme Machine Tool Company, Cincinnati, Ohio. With the bar outfit of tools, which are very simple, pieces having a maximum diameter of 2¼ in. and not over 26 in. long can be handled, while with the chucking outfit forgings and castings as large as 14 in. can be accommodated.

In the design of this tool great rigidity is assured by casting the head solid with the bed. Friction back gears and a three-step cone pulley with the individual steps large enough to accommodate a 3½-in. belt are also provided. The spindle which is of high carbon hammered crucible steel has ring oiling, babbitt lined bearings, all of which are ground and then scraped by hand. A special design of chuck which grips the work both accurately and powerfully is used. The features of this chuck are the elimination of end motion of the work when the chuck is closed, thus making it possible to do second operation work where an exact length of shoulder is required, and also the doing away with the overhang of the jaws which permits short work to be gripped without tilting the jaws. These jaws are inserted and removed readily without dismantling the chuck. A long lever at the front of the chuck opens and closes it while the machine is running, and also operates the roller feed, as the centering jaws and the rolls are automatically operated in unison. When making adjustments to feed any desired size of stock the jaws are turned by a spanner wrench until the stock is gripped. The jaws are then loosened slightly which places the rolls under the proper tension to feed the stock, which can be hexagonal, round or square.

The turret is mounted on an amply proportioned cross slide, and consists of a circular plate with radial slots for locating the tools and with holes for the bolts clamping them to the turret top. The locking bolt is placed at the front end of the slide directly under the cutting tool and works in hardened and ground taper bushings let into the solid turret. The downward pressure on the tool while taking a cut is transmitted to the turret. This construction gives what is said to be a very rigid support to the tool. In addition to the regular oil pipe each tool space has an oil hole for use with oil tube drills and tools of that character. The swinging stock stop is supported by the front of the saddle. The cross slide travels in a narrow dovetail guide provided with a gib for taking up wear. Hand and power cross feeds are provided in both directions with a large micrometer dial to indicate the amount. The power feed which is also applicable to the longitudinal movement of the turret is of the geared type and consists of four changes, any one of which is instantly available by moving the lever at the front of the head. Both the cross and the longitudinal feeds can be reversed by throwing the lever at the front of the feed box. Each tool on the turret has an independent adjustable stop, which is conveniently located for the operator and can be used in any desired combination. The automatic feed can also be tripped by these stops, and a very rigid one is used to locate the turret in its central position, as all movement of the cross slide is from the center out.

The bearing of the carriage is of the V type with large proportions, and extends the entire length of the carriage, which is securely held in position by gibs at the front and the back. In addition to the automatic adjustable stops for each turret hole, which were mentioned in the preceding paragraph, there are four auxiliary stops which may be used in any special combination. These auxiliary stops will trip the automatic feed also, and are controlled by the knob at the right end of the carriage. The working parts are all carefully protected from dirt and chips to insure an accurate output.



The 2¼ x 26 In. Combination Turret Lathe Built by the Acme Machine Tool Company, Cincinnati, Ohio.

The chip pan is made very deep to hold a large quantity of chips, and the oil tank is cast solid with it. This tank has a perforated cover which serves as a strainer and allows the oil to flow back into the tank. The oil pump which operates when the machine is running in either direction is of sufficient size to deliver an ample supply of lubricant. The regular equipment of the machine includes an improved stock supporting stand and a triple friction countershaft with ring oiling bearings, although if desired motor drive can be substituted for the latter when specially ordered.

The Pittsburgh Motor Car Company has purchased the buildings formerly occupied by the Pennsylvania Steel Pulley Company on the North Side, Pittsburgh, Pa., which it ceased to use when it disposed of its business to the Oneida Pulley Company, Oneida, N. Y. The main building is 100 x 380 ft., and is a brick structure. The Pittsburgh Motor Car Company has outgrown the plant it has been operating at New Kensington, Pa., and will at once remodel the Pittsburgh plant with the expectation of getting it in operation by February 15. The company expects to add two stories to the building a little later and increase the capacity of the plant accordingly.

New Marquette Ore Dock

A Suit to Test the 80-Cent Ore Rate in Minnesota

MARQUETTE, January 21.—At an estimated cost of $1,200,000 the Lake Superior & Ishpeming Railway Compan is to build at this port the highest and one of the greatest ore docks in the world. The pier will be of reinforced concrete. It will be 1200 ft. long, 54 ft. wide and 75 ft. high, 2 ft. higher than any ore dock yet built, and will have 200 pockets of an aggregate storage capacity of 47,000 tons. The spouts will be 35 ft. long; they will be operated in groups of six by electric motors. The steel contract has been let to the Wisconsin Bridge & Iron Company. The estimates call for 5000 tons of steel, 250,000 ft. of maple, 800,000 cu. ft. of earth filling, 8000 piles, 80,000 ft. of fir lumber and 33,200 cu. yd. of concrete. Work will begin soon, and the dock will be ready by the season of 1912.

Two Minnesota Suits

A suit which is attracting much attention is that filed with the Interstate Commerce Commission by Leon F. Lum of Duluth against the Great Northern Railway. The complainant seeks a reduction in the 80-cent railroad rate on iron ore shipments from the Mesaba range. Mr. Lum, who is the holder of a mineral tract near Grand Rapids, at the extreme western end of the Mesaba, asserts that 80 cents is an excessive charge, and that "any rate in excess of 40 cents per ton is unreasonable and unjust." He declares that because of this excessive rate, his ore is greatly depreciated in value and he is prevented from leasing or selling the same. His suit is based on the alleged refusal of the Great Northern to publish a rate on ore from Grand Rapids to the docks at Superior, Wis. Arguments were advanced that the ore owned by Mr. Lum was not merchantable, and it was suggested that "conservation of natural resoources cannot be effected by encouraging the reckless mining and shipping of ore." Mr. Lum alleges that the ore is of merchantable quality.

Another interesting suit, that of the State of Minnesota *vs.* Eliza Korrer, now penndng in the Minnesota courts has to do with the ownership of mineral bodies underlying meandered and navigable lakes, whether such ownership is vested in the State or in the owners of property on the shore of the lakes. The final arguments in the district court will be made February 28. The case directly concerns a body of ore lying partly under Longyear Lake, near Chisholm, on the Mesaba range, and which is being mined by the Euclid Mining Company. There are many meandered lakes in the iron region of Minnesota, and the State some time ago laid claim to the mineral which might be found under them.

A new mining district, the development of which is now being started, is the country in the vicinity oof Grand Rapids, at the western extremity of the Mesaba range. The Hanna interests of Cleveland are preparing to open a mine on the property of J. W. Poole, close to the shore of Pokegama Lake. A shaft will be put down and the ore deposit will be opened. The property has been named the Poole. A number of other tracts in the vicinity have been leased, and it is indicated that the new field will become one of no small importance.

On the Old Ranges

The Kloman Mining Company, controlled by John T. Jones of Iron Mountain and associates, will soon commence sinking a shaft at the Kloman mine in the Republic district. Machinery will be used taken from the old Saginaw. A recent shipment of 1000 tons received and tested at the Jones Furnace at Iron Mountain showed that the Kloman ore is of most desirable grade.

The New York Steel Company is making excellent progress with the development of the Goodman and Gleason properties, near Iron River, Mich. Some ore will be shipped the coming season. At one of the twin properties a 12 x 12 shaft is being sunk. The ore lies at considerable depth at this point, and the drifting that will open the deposits will not be started for a number of months.

Oglebay, Norton & Co. of Cleveland, already important operators in that locality, have added the old Riverton mine to their holdings in the Iron River district of the Menominee range. The property was recently abandoned by the United States Steel Corporation. It is the plan to explore and open that portion of the property as yet undeveloped. This can be done advantageously from Oglebay, Norton & Co.'s Chatham mine, which adjoins the Riverton.

The Cleveland Cliffs Company has reduced the working force at its Cleveland Lake mine at Ishpeming by 175 men, on account of lack of stockpile room.

The St. Clair Company has surrendered its contracts for drilling various properties in the district adjacent to Ishpeming, Marquette range, and has withdrawn from the field. The exploratory work for the Jones & Laughlin company will be continued by the Duluth Diamond Drill Company. This is in progress near Iron Mountain Lake and at the Winthrop location, in both of which localities there are good prospects. The Jones & Laughlin company's Lake Angeline mine, at Ishpeming, is being operated in a quiet way, although if desired the output could be materially increased.

The Production of Iron Ore in 1909 and 1910

In response to telegraphic requests by the Director of the United States Geological Survey at the close of 1910, reports and estimates of iron ore production for 1909 and 1910 were promptly sent by 18 of the largest iron mining companies, whose combined output represents about 75 per cent. of the total production of the United States. From these returns it is estimated by E. F. Burchard of the Survey that the iron ore produced in 1909, not including stocks left at the mines, was between 51,000,000 and 52,500,000 gross tons. Of this quantity 45,500,000 to 46,500,000 tons was red hematite, the remainder consisting of brown hematite, magnetite and carbonate ores in the order named. The returns for 1910 indicate that between 52,500,000 and 54,000,000 gross tons of iron ore was produced, of which between 47,000,000 and 48,000,000 tons was red hematite.

The following tables afford a comparison of the quantities of iron ore produced in the years 1907 and 1908, with the estimates of production in 1909 and 1910; and also a comparison between the quantities of iron ore produced and the pig iron manufactured. The data on the pig iron are taken from the annual reports of the American Iron and Steel Association, with the exception of those for 1910, which are estimated:

Years.—Gross tons.	Iron ore.	Pig iron.
1907	51,720,619	25,781,361
1908	35,983,336	15,936,018
1909	*51,750,000	25,795,471
1910	*53,250,000	*27,099,422

* Estimated.

The Flanders Mfg. Company.—This company, incorporated with $2,250,000 capital stock, has taken over the business of five companies with plants at Pontiac and Chelsea, Mich., engaged in the manufacture of motor cycles and automobile parts. The merged companies are the Grant & Wood Mfg. Company, with a plant at Chelsea and offices in Detroit, engaged in the manufacture of automatic screw machines and screw machine products; and four companies at Pontiac, the Pontiac Motor Cycle Company, Pontiac Drop Forge Company, Pontiac Foundry Company and the Vulcan Gear Works. Walter E. Flanders and others identified with him in the manufacture of automobiles and automobile parts control the new company, but it is announced that Mr. Flanders will remain at the head of the E M F Company. The officers of the Flanders Mfg. Company are: President, Robert M. Brownson, formerly secretary and treasurer of the E M F Company; vice-president, A. O. Smith; secretary, James B. Book, Jr.; treasurer, Harry L. Stanton. The new company will engage extensively in the manufacture of a motor cycle which has been given the name of Bi-Mobile.

New Work at Lake Shipyards

The indications now are that the shipyards on the Great Lakes will have work to carry them into the spring. The *Marine Review* gives the following particulars of contracts now on hand and the prospects:

The shipyards of the Great Lakes have 18 vessels under construction for 1911 delivery, including five bulk freighters, one car ferry, two passenger steamers, one excursion steamer, two oil tenders, one fuel lighter, one car float, two light-house tenders, two light vessels, and one quarantine steamer. Of this programme the American Ship Building Company is building eight, the Great Lakes Engineering Works one, the Manitowoc Dry Dock Company one, the Racine Boat Mfg. Company three, the Collingwood Ship Building Company four, and the Kingston Ship Building Company one.

Excluding Canadian tonnage the four bulk freighters included in this programme will have a carrying capacity of 43,000 gross tons of ore in a single trip, or 460,000 gross tons in an average season of 20 trips. Twenty bulk freighters were launched in 1910, having a carrying capacity of 194,500 gross tons in a single trip, or 3,890,000 gross tons in an average season of 20 trips. In the past nine years bulk freighters having a carrying capacity of 41,088,000 gross tons of ore have been added to the lake fleet. The 1911 programme as so far announced will increase this to 41,548,000 tons. This is practically equivalent to the yearly movement of ores during 1909 and 1910. Moreover it is generally known that additional contracts are pending. For instance, the Pittsburgh Steamship Company has been authorized by the United States Steel Corporation to build two 600-footers, and it is likely that Mr. Coulby, president and general manager of the company, will let the contracts in the near future. [It now seems likely that these orders will be withheld for some time.—*Editor* IRON AGE.] W. P. Snyder of Pittsburgh has also had plans drawn for an addition to his fleet in the shape of two 615-footers, though probably not more than one of them will be built for 1911 delivery. It is an interesting commentary that not a single bulk freighter is building for independent interests. They are all for interests identified with iron and steel making. Apparently the independent owner desires that the business shall absorb the present tonnage before he adds to it. The surplus of ships was quite acute during 1910.

Altogether 51 vessels were launched on the Great Lakes during 1910, exclusive of Canadian tonnage. The last included 20 bulk freighters, three package freighters, two passengers, one steamer, three car ferries, one river ferry, one lumber steamer, 12 tugs, three lighters, one light-house tender, one sand sucker, two dump scows and two gold dredges.

The shipyards have on hand a number of vessels undergoing repairs, some of them of an extensive character, especially those that are being altered to the arch system of construction, so that the shipyards at least are assured of a profitable winter.

Trade Publications

Automobiles. — Stevens-Duryea Company, Chicopee Falls, Mass. Pamphlet. Contains a brief description of the building of the bodies of these cars and shows them at successive stages of the manufacture as well as in completed form.

Boilermakers' Tools.—J. Faessler Mfg. Company, Moberly, Mo. Catalogue No. 27. Calls attention to an extensive line of tools for boilermakers, which includes flue expanders of the rolling type, sectional beading expanders, flue cutters, patch bolt countersinking tools, &c. All the various tools are illustrated and for the most part a description with brief specifications is given on the pages facing the engravings.

Corliss Engines.—Allis-Chalmers Company, Milwaukee, Wis. Bulletin No. 1501. Illustrates and describes the Reliance pattern of belted Corliss engines. Considerable space is devoted to describing the various parts, and the text is supplemented by engravings.

Power Plant Supervision.—Richard D. Kimball Company, 437 Fifth avenue, New York City. Pamphlet. Outlines a method of obtaining the most economical and efficient operation of power plants which this company is prepared to furnish through its department of testing and inspection to heating, lighting and power plant owners, managers and superintendents. The present methods of operating power plants are briefly discussed, with a complete statement of what can be done to increase efficiency and eliminate waste. Following this is a description of how this company proposes to bring these economies about.

Baling Presses.—P. K. Dederick's Sons, Albany, N. Y. Catalogue. Treats of a line for handling all kinds of material. The various types of presses are illustrated and described at length.

Steam Engines.—The Fitchburg Steam Engine Company, Fitchburg, Mass. Catalogue. Relates to the Fitchburg four-valve, horizontal, vertical and high speed engines. After a general description of the engines space is given to their separate parts, the text being supplemented by illustrations. This is followed by illustrations of the different types and reproductions of indicator cards taken from them. Tables giving dimensions of the various sizes and styles of engines complete the catalogue.

Universal Milling Machine.—The Garvin Machine Company, Spring and Varick streets, New York City. Circular No. 135. Calls attention to the special features of the Garvin No. 2A universal miller which was illustrated in *The Iron Age* December 15, 1910. Four views of the machine, as well as one of the positive feed gear change box, which renders 10 feeds available, are given.

Calendar. — McClintic-Marshall Construction Company, Pittsburgh, Pa., contractor for the erection of steel bridges and buildings, has issued an annual calendar. The leaves for the various months in addition to having figures for the current month, have those for the preceding and succeeding months, and the card hanger has a calendar running from January, 1911, to May, 1912. Each leaf has an illustration of some contract executed by the company or some of its plants or specialties. Among the last is the Aiken roof which was illustrated in *The Iron Age* October 6, 1910.

Calendar. — Henry Vogt Machine Company, Tenth and Ormsby streets, Louisville, Ky., manufacturer of ice and refrigerating machines and water tube boilers, has issued a calendar measuring 21 x 16¾ in. The upper part of the calendar contains a bird's-eye view of the company's plant and the calendar pad in the lower portion not only gives the day of the month in red figures but also by small numerals indicates how many days have elapsed.

Motor Cars.—H. H. Franklin Mfg. Company, Syracuse, N. Y. Pamphlet. Size 6¾ x 12¼ in. Devoted to the company's 1911 motor cars, which includes four models, two six-cylinder and two four-cylinder, with 11 styles of open and closed bodies. The special distinctive features of these models are described and this is followed by a general description of the features common to all, such as the motor, transmission gear, running gear and equipment.

Metal Sawing Machines. — Cochrane-Bly Company, Rochester, N. Y. Loose leaf circulars. Concerned with a line of metal sawing machines, saw sharpeners of the automatic type and bench and floor filing machines. The make-up of the various circulars is practically uniform, an illustration of the particular machine described therein being given on the first page, with a description on the two inside pages and specifications in brief form on the last page.

Band Resaws.—W. B. Mershon & Co., Saginaw, Mich. Catalogue. This is the company's 1911 catalogue, describing and illustrating a line of band resaws. The arrangement of the catalogue is somewhat novel, the methods of constructing the resaws being taken up first and followed by a description of the various types and their special features. The last portion of the book is devoted to useful tables and information pertaining to band saws, as well as a practical and complete treatise on the use and care of band saw blades.

Wire Rope Tramways.—The Hallidie-Painter Tramway Company, 320 Market street, San Francisco, Cal. Concerned with aerial wire rope tramways of both the single and double rope types. The various styles of tramways and buckets are illustrated.

Steam Pumps.—C. H. Evans & Co., 183 Fremont street, San Francisco, Cal. Catalogue. Refers to a line of crank and flywheel steam pumps and pumping machinery for every purpose. The various types of pumps are illustrated and brief tabular specifications are given on the facing pages. A number of tables of useful information completes the catalogue.

Electric Motors and Lighting Plants.—Fairbanks, Morse & Co., Chicago, Ill. Three bulletins. Nos. 21 and 207 give general descriptions and specifications for direct current dynamos and motors and alternating current induction motors, respectively. The various parts entering into the construction of these motors are shown and described at length. No. 34 points out the advantages of the Fairbanks-Morse complete residence lighting plants capable of supplying current for 50 30-volt lamps. The illustrations show the dynamo, the gasoline engine, the storage battery, the switchboard and some of the fixtures.

CURRENT METAL PRICES.

The following quotations are for small lots, New York. Wholesale prices, at which large lots only can be bought, are given elsewhere in our weekly market report.

IRON AND STEEL—

Bar Iron from store—

Refined Iron:

1 to 1⅞ in. round and square; 1½ to 4 in. x ⅜ to 1 in.	₩ lb 1.75¢
1½ to 4 in. x ½ to 1 in.	₩ lb 1.85¢
Rods—⅜ and 11-16 round and square	₩ lb 1.85¢

Angles:	Cts ₩ lb
3 in. x ¼ in. and larger	2.00¢
3 in. x 3 16 in. and ¼ in.	2.25¢
1½ to 2½ in. x ⅛ in.	2.10¢
1½ to 2¾ in. x 3-16 in. and thicker	2.00¢
1 to 1¼ in. x 3-16 in.	2.10¢
1 to 1¼ x ⅛ in.	2.20¢
⅞ x ⅛ in.	2.30¢
¾ x ⅛ in.	2.40¢
⅝ x ⅛ in.	3.45¢
½ x 3-32 in.	4.25¢

Tees:	
1 in.	2.65¢
1¼ in.	2.45¢
1½ to 2½ x ¼ in.	2.15¢
1½ to 2½ x 3-16 in.	2.35¢
3 in. and larger	2.05¢
Beams	2.00¢
Channels, 3 in. and larger	2.00¢
Bands—1½ to 6 x 3-16 to No. 8	2.30¢
"Burden's Best" Iron, base price	3.15¢
Burden's "H. B. & S." Iron, base price	2.95¢
Norway Bars	3.00¢

Merchant Steel from Store—

	per lb
Bessemer Machinery	1.90¢
Toe Calk, Tire and Sleigh Shoe	2.50@3.00¢
Best Cast Steel, base price in small lots	7¢

Sheets from Store—

Black	One Pass, C.R Soft Steel.	R. G. Cleaned.
No. 16	₩ lb 2.55¢	2.80¢
Nos. 18 to 20	₩ lb 2.70¢	2.90¢
Nos. 22 and 24	₩ lb 2.75¢	3.00¢
No. 26	₩ lb 2.80¢	3.10¢
No. 28	₩ lb 2.95¢	3.30¢

Russia, Planished, &c.

Genuine Russia, according to assortment, ₩ lb 12 @14½

Patent Planished, W. Dewees Wood, ₩ lb A, 10¢; B, 9¢ net.

Galvanized.

Nos. 12 and 14	₩ lb 2.95¢
Nos. 22 to 24	₩ lb 3.30¢
No. 26	₩ lb 3.50¢
No. 28	₩ lb 3.80¢

No. 20 and lighter 36 inches wide, 25¢ higher

Genuine Iron Sheets—

Galvanized.

Nos. 22 and 24	₩ lb 5.35¢
No. 26	₩ lb 6.25¢
No. 28	₩ lb 7.25¢

Corrugated Roofing—

2½ in. corrugated.	Painted	Galvd
No. 24	₩ 100 sq. ft. $3.85	4.90
No. 26	₩ 100 sq. ft. 2.95	4.00
No. 28	₩ 100 sq. ft. 2.60	3.75

Tin Plates—

American Charcoal Plates (per box.)

"A.A.A." Charcoal:	
IC, 14 x 20	$6.35
IX, 14 x 20	7.60
A. Charcoal:	
IC, 14 x 20	5.40
IX, 14 x 20	6.50

American Coke Plates—Bessemer—

IC, 14 x 20 .07 lb	$4.40
IX, 14 x 20	5.40

American Terne Plates—

IC, 20 x 28 with an 8 lb. coating	$8.50
IX, 20 x 28 with an 8 lb. coating	10.50

Seamless Brass Tubes—

List November 17, 1908. Base price 18¢

Brass Tubes, Iron Pipe Sizes—

List November 13, 1908. Base price 18¢

Copper Tubes—

List November 13, 1908. Base price 21¢

Brazed Brass Tubes—

List August 1, 1908. 19½¢ ₩ lb

High Brass Rods—

List August 1, 1908. 14½¢ ₩ lb

Roll and Sheet Brass—

List August 1, 1908. 14½¢ ₩ lb

Brass Wire—

List August 1, 1908. 14½¢ ₩ lb

Copper Wire—

Base Price. Carload lots mill 14 ¢

Copper Sheets—

Sheet Copper Hot Rolled, 16 oz (quantity lots) ₩ lb 18 ¢

Sheet Copper Cold Rolled, 1¢ ₩ lb advance over Hot Rolled.

Sheet Copper Polished 20 in. wide and under, 1¢ ₩ square foot.

Sheet Copper Polished over 20 in. wide, 2¢ ₩ square foot.

Planished Copper, 1¢ ₩ square foot more than Polished.

METALS—

Tin—

Straits Pig ₩ lb 40¼@40⅝

Copper—

Lake Ingot	₩ lb 14½@14⅝
Electrolytic	₩ lb 14½@14⅝
Casting	₩ lb 14¼@14⅜

Spelter—

Western ₩ lb 6 @

Zinc.

No. 9, base, casks ₩ lb 5 ¢ | Open ₩

Lead.

American Pig	₩ lb 5 @
Bar	₩ lb @

Solder.

½ & ½, guaranteed	₩ lb 16½@17
No. 1	₩ lb 24@24½
Refined	₩ lb 22 @22½

Prices of Solder indicated by private brand vary according to composition.

Antimony—

Cookson	₩ lb 8@
Hallett's	6½@
Other Brands	@

Bismuth—

Per lb $2.00@$2.25

Aluminum—

No. 1 Aluminum (guaranteed over 99% pure), in ingots for remelting	30
Rods & Wire	Base Price 35
Sheets	Base Price 35

Old Metals.

Dealers' Purchasing Prices Paid in New York

	Cents
Copper, Heavy cut and crucible	₩ lb 11.00@11.25
Copper, Heavy and Wire	₩ lb 10.75@11.00
Copper, Light and Bottoms	₩ lb 9.75@10.00
Brass, Heavy	₩ lb 7.50@ 7.75
Brass, Light	₩ lb 6.75@ 6.85
Heavy Machine Composition	₩ lb 9.75@10.00
Clean Brass Turnings	₩ lb 7.25@ 7.50
Composition Turnings	₩ lb 8.25@ 8.50
Lead, Heavy	₩ lb @ 4.25
Lead, Tea	₩ lb @ 3.50
Zinc Scrap	₩ lb @ 4.00

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